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DIESEL RAILWAY TRACTION

The October issue of this RAILWAY GAZETTE publication, illustrating and describing developments in Diesel Railway Traction, is now ready. price 2s.

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THE RAILWAY GAZETTE

33, TOTHILL STREET, WESTMINSTER, S.W.1

International Timetable Conference at Brighton

FOR the first time since 1931 Great Britain has been selected as the venue of the International Timetable & Through Carriage Conference, which, as recorded elsewhere in this issue, opened at Brighton on October 5, and will last until October 15. The discussions were opened by Sir Eustace Missenden, Chairman of the Railway Executive, and the Executive is represented at the Conference by Mr. R. H. Hacker, Chief Officer, Continental, Railway Executive. Mon. C. Lucchini, of the Swiss Federal Railways, heads this year's conference which is composed of more than 200 delegates, from almost all European countries. Spain and Portugal are absent, but Russia has sent eight delegates and the Eastern European countries, including Roumania and Bulgaria, are well represented. The method which the Conference adopts is to take what it considers to be the six principal European trains—the Simplon Orient; Orient; Arlberg Orient; Nord; Scandinavia-Swiss-Italian; and Balt-Orient Expresses—and devotes possibly a whole day to each. On this basis the timetables of all other important European expresses are arranged. As the travel situation changes each year, it is necessary to plan afresh at each conference. For instance, services to Italy will require special attention this time, in view of Holy Year next year, and this will entail additional rolling stock to accommodate the heavy pilgrim traffic.

Mr. George Ellson

The death of Mr. George Ellson followed closely on that of Sir Herbert Walker, with whom as Chief Engineer of the Southern Railway, he was associated for many years. Portraits and some biographical details of these two outstanding railway officers are given elsewhere in this issue. Mr. Ellson was Chief Engineer for 16 years, and that long period of office coincided with a big programme of improvements and extensions to the electrification of Southern track in the suburban area, and a large programme of new works. Heavier engines and increased speeds called for improved permanent way, and Mr. Ellson made a detailed study of track-work in all its aspects. The success which has attended the intensive working of the Southern lines is a tribute to the skill and unremitting care which he brought to this task. Many new works were carried out under his direction, including civil engineering in connection with the electrification of the lines to Windsor, Brighton, Worthing, Sevenoaks, Eastbourne, Hastings, Portsmouth (via Guildford), Alton, Bognor Regis, Littlehampton, Portsmouth (via Horsham), Gillingham (Kent), Maidstone, and Reading. He gave his name to a rail joint which he invented. In other directions, the opening of the train-ferry dock at Dover brought to a successful conclusion a difficult undertaking involving several novel methods of construction. It is, however, with the remarkably prompt repair of war damage on the Southern that Mr. Ellson's name will be specially associated.

Victorian Comment on the Elliot Report

In our issue of August 5 we commented on Mr. Elliot's report on the Victorian Government Railways. Opinion in Victoria—as expressed in an editorial in *The Commonwealth Engineer*—follows much the same general lines. After mentioning criticisms on the report that: (a) the railway system is gradually running down for lack of staff, maintenance and finance for capital works and renewals; (b) there is too-ready acceptance of unpunctuality as inevitable; (c) carriage-washing plant is needed to improve the condition of carriages; and (d) rates and fares are too low, the editorial goes on to deal *inter alia* with the financial recommendations. It points out that control of its own finances would enable the railway administration to provide funds annually for interest, sinking fund, and renewals and replacements, and to frame its construction programme without having to wait for Parliamentary allocation of funds year by year. Hitherto railway estimates have been the plaything of the politicians, whereas a railway should be run on business lines. The editorial concludes with the statement that in the past indirect financial responsibility has resulted in the writing off of lost capital, "a state of affairs that should not be allowed to recur."

Removal of Import Restrictions

In a recent statement in the House of Commons, Mr. Harold Wilson, President of the Board of Trade, announced the removal of licensing restrictions on the import of a wide range of goods from countries in both O.E.E.C. and other areas, where there is no risk of loss of gold, or dollars. The relaxations amount to an issue of Open General Licences, valid, with certain exceptions, from October 5 and total value of the articles now freed is about £75,000,000, or one-quarter of the £300,000,000 1948 imports of the goods concerned from O.E.E.C. countries. Among the goods freed are various mineral products and metals; machinery, including mining and stone-working plant; railway locomotives and rolling stock, as well as parts, excluding axles, tyres and wheels; industrial trucks; certain electrical goods; and metal manufactures, including steam boilers and castings. In July, Mr. Wilson mentioned the Government's intention to remove certain import licensing restrictions, so as to liberalise European trade. O.E.E.C. supported this initiative by calling on its members to introduce measures for relaxation of restrictions, as a step towards the abolition of trade restrictions and the United Kingdom has taken the lead in this matter.

Institute of Transport Luncheon

On September 29, Mr. David Lamb, the President, and the Council of the Institute of Transport entertained Editors of transport journals at luncheon. This has become an annual function and one which by all indications is enjoyed equally by hosts and guests. The recent occasion was particularly interesting, because it came at the end of a very successful year of office of a President who is himself the Editor of one of our best-known contemporaries, *Modern Transport*. As one of the speakers remarked, he had performed with some distinction the acrobatic feat of sitting on both sides of the table at once. Mr. C. F. Heywood, Editor of *Motor Transport*, who replied to the President's welcome to the Press, pointed out that one of the great advantages that the Press enjoyed as against transport was that they were not "integrated." After the luncheon the President received the trust deed for the establishment of a Commercial Motor Users' Association Road Transport Research Fellowship, which will enable selected members of the Institute to travel abroad, and prepare reports on overseas transport matters. Brig-General Sir H. Osborne Mance, the President-elect, who took office two days after the luncheon, was introduced by Mr. Lamb as the foremost authority on international transport.

Ulster Transport Authority's First Year

At the end of September the Ulster Transport Authority completed its first year of operations. It took over the Northern Ireland Road Transport Board and the Belfast & County Down Railway as from October 1, 1948. Since then it has acquired the Northern Counties Committee railway and is now engaged in putting its case before the Transport Tribunal in Belfast for the discontinuance of services on the County Down Railway. It is also concerned in discussions with the Southern Irish transport authorities over the future of the Great Northern Railway (Ireland). According to statute, the U.T.A. should present its accounts within two months of the end of its year, but its first year of operations has been so complicated that this period is likely to be extended. The Authority has recently taken over and modernised headquarters premises in Belfast. The progress it has achieved in its first, a difficult, year will lend added interest to its report when available.

Workmen's Tickets Variations

Because of the necessity which may arise during the coming winter to vary hours of work in certain factories, and so on, so as to assist in the spreading of the industrial electricity load, the British Transport Commission has agreed to the issue of workmen's tickets outside the normal hours. This is a temporary measure which will apply to both rail and road services controlled by the Commission. On weekdays and Sundays, workmen's tickets will be issued on production of an identity card authorised by the undertaking concerned and signed by the employer, to workmen coming

within the categories of artisans, mechanics and labourers who are required to work shifts of regular turns of duty commencing at any time of day. They will also be issued to other workers, if they are required, as a consequence of approved arrangements to spread the power load to travel to work outside the normal hours, and if previous to the introduction of the arrangements to spread the power load, their days and hours of work were such that they availed themselves of workmen's tickets. In these cases a special card of identity will be necessary.

Overhead Equipment Construction Vehicle for B.R.

The adoption by British Railways of the overhead system for main-line electrification, as exemplified in the Liverpool Street to Shenfield and Manchester to Sheffield projects, adds topical significance to the new London Midland Region overhead equipment construction unit described elsewhere in this issue. The new unit consists of a two-car diesel-propelled articulated unit and a wire wagon. Built largely with components of other vehicles, it is based on experience gained on the Manchester to Altrincham line. This, until recently, and since the conversion to the third-rail system of the former London Brighton & South Coast Railway suburban lines, and the abandonment of electric working on the Newport to Shildon section of the former North Eastern Railway, has been almost the only overhead electric line in Great Britain, and the only one of its kind to afford experience with the more modern types of overhead equipment. The unit comprises remote-controlled diesel engines geared for slow running and smooth acceleration, a fully equipped repair van with storage space, accommodation for the maintenance staff and train crew, and an ingenious inter-communication system, together with a long flat roof and ready access to the overhead wires. For the time being the unit is restricted to the Manchester to Altrincham section, although capable of wider application.

Fatigue Failures in Bridgework

Fatigue failures in bridgework have not occurred frequently in the past, but they may now well become more common in structures which are nearing the end of their useful lives, and where reconstruction has been postponed due to shortage of steel. It is noteworthy that current standard specifications for bridgework are comparatively silent on the subject of fatigue, though it is generally recognised that, in certain circumstances, some parts may be liable to failure resulting from fatigue. For instance, the practice of welding or riveting cover plates, stiffeners and other forms of reinforcement to R.S.Bs used as stringers in long-span bridges or as minor bridge spans—both of which are subject to a large number of stress cycles during the passage of a live load—introduces stress raisers that may cause fatigue failure of the beams during the working life of the bridge.

Fatigue Strength of Reinforced R.S.Bs.

This important matter has recently been investigated in a series of tests made at Illinois University, the report upon which is the subject of a review on page 414. The tests revealed *inter alia* that the relative fatigue strengths of simple and reinforced rolled steel beams subjected to 2,000,000 repetitions of a cycle, in which flexural stress varied from zero to a maximum, were as follow:—

Test specimen from a 12-in. × 31-8-lb. R.S.B.	Fatigue strength (lb. per sq. in.)
(1) Without any reinforcement ...	31,200*
(2) With part-length cover-plates continuously welded ...	8,000 to 11,000
(3) With part-length cover-plates intermittently welded ...	8,400 to 9,400
(4) With full-length cover-plates continuously welded ...	22,800
(5) With full-length cover-plates intermittently welded ...	16,500
(6) With full-length riveted cover-plates ...	21,600
(7) With part-length riveted cover-plates ...	16,900

* This appears to correspond with the probable fatigue strength of a plain polished fatigue specimen.

These investigations would appear to serve as a pointer to the designer of structures for heavy oft-repeated loads.

A London Transport Bridge Replacement

London Transport is replacing with new spans a bridge at Stamford Brook which carries two tracks of the four-track District and Piccadilly lines across coal sidings of the London

Midland Region. The original spans date from 1869, when the London & South Western opened an extension from Kensington to Richmond. After the District Railway gained running powers over the section, the service became an intensive one for steam working, and though the L.S.W.R. services disappeared during the first world war, the bridge has since carried an intensive electric service of District and, subsequently also, Piccadilly trains. Because of the frequency of the service the engineers have only a 5½ hr. possession, and the work therefore is being carried out on separate Sunday mornings for each one of the four spans to be dealt with. The new spans, with their reinforced concrete decking covered with tiles, are erected in turn on steel staging close to the south side of the bridge, preparatory to being rolled into alignment and lowered into position by cranes standing on the track.

Relay Interlocking at Liverpool Street

The introduction of relay interlocking at Liverpool Street with the inauguration of the Shenfield electrification is of special interest as marking the adoption of the panel system at a London terminus and one carrying an unusually dense suburban traffic. This will enable a direct comparison to be made between panel and power frame under heavy service conditions which are of considerable interest to operating officers and signal engineers alike. At Stratford also there is an important panel installation, and there are others along the route, where, of course, the semaphore has throughout given place to the colour-light signal. From about 1897 until the recent change, these busy suburban lines of the former Great Eastern Railway had been worked by Sykes lock-and-block of an especially complete form, installed under the direction of F. T. Hollins, the Telegraph Superintendent, whose rail-contact, incorporating a friction clutch, contributed to the regularity of the working and great freedom from mishap always experienced in this area.

A New Railway Wage Claim

THE two-day delegate conference of the National Union of Railwaymen resulted in an acceptance of the Conciliation Board's recommendations against the men's claim for a wage increase of 10s. a week and higher payment for Saturday afternoon work. The outcome of the meeting was a tribute to the good sense of the rank and file of the union. An undertaking had been given before the Conciliation Board commenced its inquiry that its findings would be accepted both by the Railway Executive and the union, and although the union's pledge had to be implemented by the delegates, it soon became clear that the conference was out of sympathy with the relatively small proportion of the men who suggested working to rule and refusing overtime work in protest at the findings.

The conference instructed the N.U.R. Executive Committee to reopen negotiations with all the Executives under the British Transport Commission with a view to an improvement in wages being obtained for the lower paid employees. It added that the men considered that no employee should be in receipt of less than a £5 standard weekly wage, exclusive of the London allowance. The establishment of a £5 minimum weekly wage for railwaymen would have implications over a far wider range of industry than the railways. Presumably it would also eliminate a number of differentials among the lowest paid railway employees and have distinct implications on some overtime rates.

The claim for improvement in the wages of the lower paid employees shows a more reasonable attitude of mind on the part of the men. It makes all the more regrettable the arbitrary refusal of their leaders to discuss, at an earlier stage in the negotiations, the offer which was made by the Railway Executive to ease the position of these same categories of employees. The Railway Executive offer has not been renewed, and since it was made the financial position of the railways has deteriorated further. There is no indication as yet as to whether the two other railway unions, the Railway Clerks' Association, and the Associated Society of Railway Engineers & Firemen, will take part in any new wage negotiations which the N.U.R. will endeavour to open with the Railway Executive.

Sir Herbert Walker

THE death of Sir Herbert Walker, of whom a portrait and biography appear elsewhere in this issue, removes a figure who had achieved a great reputation in the railway world. After having served as General Manager of the London & South Western Railway since 1912, he became, after the 1923 amalgamation, General Manager of the Southern Railway, and until 1937 was the dominant figure at the Waterloo headquarters. The 25 years of his tenure of office there covered a period of intense activity in the development of transport. That quarter of a century was a time of ceaseless change or transition, during which a series of crises modified the national economy in root-and-branch fashion. Through all the difficulties caused by the first world war, labour troubles, the trade slump of the 1930's and the competition of new types of transport, Walker held unflinchingly on his way, carrying out with quiet determination the measures which seemed good to him in each emergency as it arose. When he retired in 1937, and took a seat on the board, he had the satisfaction of knowing that the Southern system had restored its passenger receipts almost to the level of 1923—a year of short-lived prosperity—and was able to pay an average dividend of slightly over 4 per cent. on its capital.

Walker had the good fortune to obtain his first General Managership at the age of 44, and, enjoying good health, had abundant energy to use a wide experience gained in the London & North Western traffic departments. His manner, methods, and outlook at that time were characteristic of the Euston school of railwaymen, which reached maturity under Sir Frederick Harrison. The North Western system of training was based on a judicious blend of outdoor and office work. It developed self-reliance and decision among the "runners" and junior officers, but was apt to turn them into sound administrators, proceeding on orthodox lines, rather than to make them innovators bringing new ideas to bear on railway operations. This tendency reflected the failure of "the premier company" to keep, during the opening years of this century, the lead in enterprise among the principal British railways.

There can be no question that Walker was in the first rank of railway administrators. He might be said to have personified the qualities most highly esteemed in official railway circles. He had the gift of quick decision, going straight to the root of the matter in hand. He kept interviews short as a rule, and so cleared off a lot of business with despatch. He was an ideal chairman of a Railway Clearing House meeting—punctual, direct, and brief in speech, grasping a point at once—and was a master of procedure.

Having noted the virtues which made Sir Herbert Walker effective as a railway executive, we feel bound to add that there was a certain lack of imagination in his mental equipment. He cannot be placed among the select band of chairmen and general managers who took a predominant part in shaping general railway policy during the last decades of private ownership. Possibly the specialised nature of the Southern Railway's operations tended to restrict his interest in some of the problems affecting the other companies, whose prosperity depended mainly on freight traffic receipts. The development of the Southern region had been mapped out on clearly-defined lines before Walker had left Euston for Waterloo. The Continental services furnished by the railways south of the Thames were firmly established; business with the Channel Islands and the Isle of Wight was also growing. In 1892 Southampton Docks were transferred to the London & South Western Railway, and steps were taken at once to improve the port's facilities. As long ago as 1898, the London Brighton & South Coast Railway first ran complete Pullman trains, setting a precedent for arrangements which later became a distinctive feature of Southern Railway practice. What was of vital importance, however, was the lead towards electrification given by the "Brighton" in 1909. This move might have been made five or six years earlier, when the Lancashire & Yorkshire and the North Eastern Railways electrified suburban lines at Liverpool and Newcastle, respectively; but it opened the way for the use of electric traction in London suburban and outer-suburban areas originating a dense traffic.

It follows that Walker was not setting out on uncharted seas when he went south of the Thames. His great merit was that he held steadfastly to the activities which the railways in that

territory had special aptitudes for pursuing. His management throughout was not so much distinguished for originality as it was "rich in saving commonsense." The glamour of Continental travel did not distract his attention from ensuring that the Southern's steamship services earned a substantial profit. Docks are seldom a remunerative form of investment, but, in spite of heavy expenditure at Southampton and Dover, Walker could show a return of $2\frac{1}{2}$ per cent. on the capital invested. Of course, the outstanding example of his method was the gradual conversion from steam to electric working of 600 route-miles of railway in such a way that each stage represented a sound commercial proposition. On the other hand, his ingrained habit of watching costs drove him to modify the original plans for rebuilding Waterloo Station and, in the opinion of some critics, to spoil an admirable design.

If Sir Herbert had mixed more with the outside world, instead of burying himself in his railway work, he might have taken a less strictly utilitarian view of many questions. His opinions on transport carried weight with Government departments and especially with the Quartermaster General to the Forces, but he rarely came before the general public as a spokesman for the railways. The Institute of Transport would have been delighted to appoint him President many years ago, but he declined emphatically to allow the Council to consider his name. That was just one example of a custom, which grew upon him, of isolating himself in his own sphere of immediate interests. If he had been more forthcoming, he might have filled a larger place in railway history, instead of being content to weld the constituent parts of the Southern Railway into an efficient and profitable entity.

Great Northern Railway Company (Ireland)

THE financial history of the Great Northern Railway Company (Ireland) has been carried a stage further by the issue of a statement at the end of September. It will be recalled that stockholders were advised on July 28 that, as from the end of June, it had become necessary that expenditure should be met out of receipts. During the current half-year, by comparison with the same period in 1948, the tendency has continued for receipts to fall and expenses to rise. In the third quarter a surplus was earned, as the Directors expected when they issued their report in July, but it was much smaller than in 1948.

In the fourth quarter of the year it is realised that this surplus will dwindle, so that with the volume of traffic, which is the measure of public demand, continuing to fall, it will be necessary to extend the normal reductions in services effected each year in the winter timetable. That timetable, which is about to be issued, will apply from October 10. It is hoped that the effect on employment of the curtailment in services will be small, and confined mainly to those groups of retirement age and on those whose engagements are normally seasonal. In any event, the company is bound to adjust the services it operates to the effective demand.

Expenditure on materials and equipment for new construction and renewals has stopped, except for what is needed to secure safety and to complete work in progress. The retention of sufficient cash resources is thus assisted with no serious prejudice to employment as only a small part of the staff is engaged on new construction and renewals. To help the maintenance of employment in the workshops at Dundalk, the company will welcome outside orders for work.

It is emphasised that it is only by restrictions on expenditure for new construction and renewals that the company can hope to retain the cash required to continue its operations in the period of lowest receipts on which it is now entering. Nevertheless, it is quite clear that these restrictions can be no more than a temporary expedient, and that the need for stable arrangements for the future of the system becomes increasingly more urgent.

The grave financial position of the G.N.R. (I.) has been dealt with in our columns on several occasions recently. It is clear that the independent existence of the railway cannot continue much longer, and that its future must lie either with Coras Iompair Eireann or the Ulster Transport Authority, or both. The statement issued by the company states that elaborate figures covering every aspect of the company's busi-

ness over the last 25 years have been furnished by request to the chairmen of these two transport undertakings, but that no further information is available as to any progress made towards decisions on the company's future.

The Railway Position in North America

AN article in our September 23 issue reported such a steep decline of traffic on the U.S.A. railways that it was headed "Slump in American Railway Business." The position was worse in July; net railway operating income fell from \$105,000,000 to \$50,000,000. This decrease of 52 per cent. in earnings left the railways with a net income, after fixed charges, of \$27,000,000, compared with \$77,000,000 in July, 1948. No fewer than 30 railway companies have failed to earn their fixed charges in the first seven months of this year.

Details of wagon loadings in the States, just to hand, show that the downward trend continued throughout August. For the 34 weeks to August 27 loadings were 12 per cent. below 1948 and 15 per cent. under 1947. Over the same period of 34 weeks, the Canadian railways loaded 3 per cent. fewer wagons than they did in 1948. In the last week ended August 27, loadings were up 1.3 per cent. For the 34 weeks, the number of wagons received from connecting railways declined by 123,500, or 10 per cent., according to the Dominion Bureau of Statistics. The exchange of traffic with U.S.A. lines has not weakened as seriously as our previous article suggested, but is not going well.

In the course of the debate in the House on September 27 and 28, the Chancellor of the Exchequer and the President of the Board of Trade enlarged on the possibilities of increasing British exports to the States and Canada. Hitherto railway wagon loadings have been a sound gauge of prosperity in these great countries, and the persistent fall of this trade barometer raises doubts about the capacity of North American markets to absorb more of our goods. During the coming winter, North American railway and trade statistics will be most informative.

Tasmanian Government Railways

THE report for the year ended June 30, 1948, of the Tasmanian Transport Commission, shows that the Tasmanian Government Railways incurred an increased deficit caused largely by fall in passenger revenue with a rise in working expenses. The following are some principal figures:—

	1946-47	1947-48
Mileage open	640.5	614.25
Passenger-journeys	3,252,508	2,974,062
Passenger train-mileage	1,162,387	1,092,938
Railcar mileage	614,640	578,974
Goods tonnage conveyed	865,605	789,941
Goods ton-miles	63,585,828	65,143,525
Passenger revenue	247,042	220,824
Goods traffic revenue	551,197	625,723
Total operating revenue	898,239	957,950
Working expenses	1,126,091	1,322,833
Loss on working	233,357	364,833
Interest & depreciation	233,839	243,588
Surplus stores recovered	8,802	3,680
Deficit on operation	458,394	604,791

The number of passenger-journeys exceeded the total of 2,412,307 for 1939-40 and suburban passengers were 60 per cent. of the total number. Railcar mileage was 53 per cent. of passenger train-mileage as compared with 60 per cent. for the previous year. The increase in goods traffic revenue largely was due to increased movement of fruit, and to an increase of 12½ per cent. on all rates as from July 21, 1947.

The report states that the chief causes of the losses in operation were: neglect by previous administrations to provide sufficient funds to maintain capital assets; the war, resulting in run-down of equipment and loss of manpower; and post-war shortages of manpower and materials. Mention is made of the increased efficiency of the railways since the Transport Commission was appointed. Since 1938, goods traffic has increased by 72 per cent., and goods revenue by 110 per cent., the number of passengers by 29 per cent., and passenger revenue by 72 per cent.; the density of traffic has increased by 84 per cent., the number of tons per train-mile by 38 per cent., and the average tractive power of locomotives by 11.5 per cent.

In December, 1947, Mr. W. D. Chapman, Director of Civil Engineering in the Commonwealth Department of Transport, was appointed to act as a Board of Inquiry into the management and operation of the system. His principal recommendations included the obtaining of second-hand steam locomotives from the mainland of Australia to tide over a power shortage; obtaining of medium steam and medium and heavy diesel-electric locomotives; revision of freight rates; and development of State-owned road transport. It also was found that electrification was not justified at present.

These recommendations are being carried out. Some of the second-hand locomotives from the mainland are now in service, and delivery of new steam and diesel-electric locomotives is expected to begin in 1950. Approval was given for increases in freight rates to take effect from October 18, 1948. They included increase of the General Main Line Commodity Rate from 56s. to 70s. 3d. a ton; cancellation and substitution by tariff rates of Special Main Line and Commodity Rates; and increases of certain rates, such as by 25 per cent. on agricultural produce, fruit, fertilisers, timber, and livestock, by 33½ per cent. on coal, and by 50 per cent. on minerals and pulpwood.

Electric Locomotives in South Africa

ELECTRIFICATION of South African Railways lines in the Reef area, around Johannesburg and Pretoria, has reached the point where elimination of steam working can be foreseen in the relatively near future. The administration has had considerable numbers of Metropolitan-Vickers four-axle electric locomotives in service for some 20 years, but these were designed primarily for the Natal System, where severe gradients and curvature generally restrict speeds to a maximum of 45 m.p.h. Conditions on the Reef permit much higher speeds, there being a general absence of sharp curves and a high standard of permanent way. These circumstances warranted a new design of locomotive for main-line passenger and goods trains on the Reef lines, at the same time making a more powerful machine possible by the use of six motors instead of four, and a higher axle loading. An order for 28 Co + Co locomotives accordingly was placed with Metropolitan-Vickers by the South African Railways Administration in 1944.

An illustrated description of the new locomotives (Class "3E") begins in this week's issue. They have a 1-hr. rating of 2,700 h.p., and provision is made for multiple-unit operation in pairs. The earlier Bo + Bo 1,200-h.p. locomotives are worked in multiple with up to four units. In the new design the motors are safe for operation at track speeds up to 70 m.p.h., while a balancing speed of not less than 60 m.p.h. is required with a 600-ton passenger train hauled by two locomotives on level track. The six-motor arrangement permits three motor combinations without exceeding 1,500 volts per motor on the 3,000-volt d.c. supply, and by providing three weak-field steps in each combination a total of 12 economical running speeds is obtained, compared with four in the earlier locomotives. There also has been a change in the method of field-shunting, the tapped windings of most of the previous machines being replaced by tapped diverter resistances in series with inductive shunts. With this system the first weak-field step is taken directly after the full-speed notch of each motor combination, instead of there being an intermediate step in which a section of the accelerating resistance was reinserted temporarily.

Regenerative braking is not provided in the "3E" locomotives, which were not designed for the hilly Natal lines, although in the exigencies of post-war motive power shortage some of them have been running there. There is a high degree of standardisation in mechanical and electrical parts with the Natal locomotives, but the 450-h.p. motor of the "3E" class is a new design based on experience with the preceding 300-h.p. type. It is of interest at the present time, when electrical methods of checking wheel slip during acceleration are seen in various electric and diesel-electric designs, that in this case the method of mounting the motors in the bogies is held to be a sufficient safeguard against weight transfer, and is stated to permit about 10 per cent. more tractive effort without wheel slip than is possible with

conventional three-motor power bogies. The motors are axle-hung, and drive through torsionally-resilient gearwheels to minimise transmission of mechanical shocks to the armatures.

Some of the conditions in which the locomotives have to operate are exacting, air temperatures ranging up to 104° F. in summer, for example, and the air being often laden with highly abrasive dust from mine dumps. Four sets of viscous oily filters are provided therefore in the sides of the body to cleanse the ventilating air before it is delivered to the motors by the two blowers, each supplying 8,000 cu. ft. per min. at 1,400 r.p.m. The blower motors also drive two 110-volt d.c. generators for operating auxiliary machines, heating, lighting, and the electro-pneumatic control system. An important feature of the control equipment from the point of view of maintenance is that all the unit switches are of the same pattern, the only difference being the provision of double-cell arc chutes of special construction on those which act as line contactors. Shunt transition is used, but the rapid action of the unit switches reduces to a minimum the time during which tractive effort is lost due to one group of motors being short-circuited. In the earlier locomotives some of the transition circuit changes were made by means of a separate drum-type pneumatic changeover switch. Overload and no-volts protection for the motors follows the previous method of using relays to trip some of the resistance and line contactors.

Considerable interest has been shown in the "3E" locomotives since they first went into service in 1947, and our article this week records that some of the units put up a respectable mileage in main-line service during their first year of working, even on a route for which they were not designed. The return of normal conditions should give the opportunity of assessing their capabilities in more favourable circumstances than some of them have enjoyed hitherto.

"Who Gets the Railroad Dollar?"

THIS query is the title of a booklet by Dr. Jules Backman, Associate Professor of Economics, New York University. The distribution of each dollar in 1948, when the U.S.A. railways had a record operating revenue, was:—

Payroll costs, covering salaries and wages, unemployment insurance and retirement benefits	49.5 cents
Materials and supplies	22.6 "
Depreciation	4.2 "
Miscellaneous expenses	5.4 "
Taxes	7.9 "
Fixed charges for interest and rents of leased lines and equipment	7.4 "
Dividends to stockholders	3.0 "
Total	100.0 "

The table shows that the direct labour costs of railway working are high; indeed coal mining is the only important industry in which labour absorbs a larger share of sales revenue, around 59 per cent. More capital, however, is required to start a railwayman at work than to provide employment for a coal miner. Between 1939 and 1948 the average hourly rates of U.S.A. railwaymen, excluding officers, rose 89 per cent. and average weekly earnings 98 per cent. Despite the increase in the cost of living, railwaymen could buy more with 1948 earnings than in 1939; in addition they now have holidays with pay.

Normally the railways buy about 23 per cent. of the bituminous coal, 19 per cent. of the fuel oil, 17 per cent. of the iron and steel and 16 per cent. of the timber produced in the States. Since 1939 the price of fuel and other commodities has advanced by 115 per cent. The mounting costs of labour and materials reduced the 1948 net railway operating income to 10.4 cents per dollar of operating revenue. This low figure compares with an average of 14 cents for the four years 1936 to 1939, when operating revenue averaged no more than \$3,945 million, and is not sufficient to help the railways to carry out necessary improvements, which can be financed only in part out of depreciation funds and by the sale of equipment trust certificates.

Writing in an easy, but dignified, style, Dr. Jules Backman has set out the facts of the American railway position in 26 brief articles, along with nearly as many diagrams. The booklet is being circulated through the Public Relations organisation of the U.S.A. railways.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

A Remarkable Railway Renaissance

Frognaal, September 30

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—An editorial in your issue of December 6, 1946, described how Mr. John W. Barriger proposed to reshape the Chicago, Indianapolis & Louisville Railway by spending \$25,000,000 on the property. Passenger trains were to run at 100 m.p.h. and freight trains at 70 m.p.h. A fortnight later you published a letter from "Sceptic," which queried the case for the expenditure, and the latest results of the "Monon," as the line is called locally, justify his qualms.

On September 24 Mr. Barriger withdrew sleeping-car services between Chicago and Louisville and stated that the current direct out-of-pocket loss on the "Monon's" passenger trains was about \$85,000 per month. As the passenger revenue during the first six months of 1949 was only \$553,000, a saving would be effected by the "Monon" going out of passenger business in a competitive area.

Even as a freight line the "Monon" is going downhill. In the first half of 1949 its total revenue decreased by 5 per cent., while its operating expenses increased by nearly 6 per cent., with the result that its net railway operating income decreased by 68 per cent. Truly a remarkable sort of renaissance! It is understood that your correspondent "Sceptic" is alive and is not at all surprised.

Yours faithfully,

R. BELL

Poppet Valve Gears

66, Eton Rise,

Haverstock Hill, N.W.3. September 29

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have read your editorial reference to the subject of poppet valve gears in your impression of September 23 with a good deal of interest for the reason that I was very prominently associated with the early developments which you recall. In view of the foregoing, perhaps I may usefully enlarge on your remarks and correct a mistake made regarding the first application of poppet valves to a locomotive on our railways.

I became connected with poppet valve gears in 1924, and just previous to that date Sir Nigel Gresley had under consideration the question of trying poppet in lieu of piston valves as an experiment. The details of this application were worked out towards the end of 1924, the gear being designed for fitting to L.N.E.R. 0-6-0 type engine No. 8280, G.E. section, and the conversion made at Stratford after Davey Paxman & Co. Ltd., Colchester, had made the equipment in accordance with drawings prepared by my company, Lentz Patents Limited, later Associated Locomotive Equipment Limited.

Engine No. 8280 had oscillating cam operated valves worked by the existing link valve gear, though a modified Hackworth gear had been considered. This engine ran very well, and because of its "free running" one of the 4-6-0 passenger engines was fitted with a similar valve arrangement in 1926, but whereas the goods engine had a valve chest made as a separate unit from the cylinders, the passenger engine had the valve chambers cast integral with the two cylinders in one casting. Intermediate levers were also introduced between the valve spindles and cams, which improved the valve openings. In the case of No. 8280 the valve spindles were fitted with follower rollers contacting direct with the cams.

In connection with the 4-6-0 application rather an interesting thing happened as a result of the large valve openings, because we discovered that some power was lost at relatively slow speeds and at moderately short cut-offs because of the very rapid fall in pressure at the moment of "release." Indicator diagrams showed this quite clearly, and as a result modified exhaust cams were fitted, formed to delay the point of "release." This engine was very free running, and I made several trips with both 8280 and 8516 in ordinary service.

You mention the rotary cam gear fitted to the three-cylinder D49 "Shire" class engines. This was a most interesting and instructive development. My company conceived the idea of a step cam gear, being attracted by its simplicity. In practice it was not quite so easy as it appeared, but with the co-operation of Sir Nigel Gresley, together with the interest displayed by Mr. Bulleid and the drawing office at Darlington, a satisfactory arrangement was evolved, a feature of which was a step cam made in accordance with Sir Nigel Gresley's suggestion and which I told him I did not think could be made. However, I was quite mistaken, because the North British Locomotive Co. Ltd. worked out a very efficient method resulting in our being able to use cams formed in steps made

in one solid block, which could be slipped on and keyed to the cam shaft. Previously a series of ring cams had been fitted with very unsatisfactory results. A number of these three-cylinder engines was subsequently fitted with this gear, and it is, I think, probable that few if, indeed, any other poppet valve engines have run anything like the mileage these have over the last twenty years or more.

This is, in a measure, the inside early history of the "R.C." gear, which we later developed still further, due to the joint efforts of Mr. A. Reidinger and myself. For some time we were conscious of the fact that improvements should be possible, though with the exception of trying a "continuous cam" I personally did little. Later, as a direct development of earlier experiences and representing the work of practically 25 years, the latest rotary cam gear, the "R.R." described in your issue now under notice, has been designed and built, and is unique in that it is the only cam gear of its kind using differential cams positively to provide the valve events constituting the locomotive cycle.

Yours faithfully,

E. C. POULTNEY

London and Outer Area Services

The Deanery,
Stanley,

Falkland Islands. August 30

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—My suggestion for a railcar service between Oxford and Winchester would lose a lot of its point (a connection between the Midlands and the South) if it were operated to Cheesehill Station, a mile from the Southern connecting services. Nor would a continuation to Eastleigh really help, as the service from there is poorer than from Winchester. I was aware that in the war the connection at Winchester Junction was only in the up direction, but the provision of a crossover to allow trains from Newbury to reach the down line, seemed a simple matter. Mr. Hunt seems to suggest the need for a connection on the down side; this could be easily arranged, but the provision of a "burrowing junction" seems a luxury for a single line. Is not the improvement of the Southern station at Winchester, so as to permit the closing for passenger traffic of Cheesehill, just one of those improvements and economies which common ownership under the Transport Commission ought to bring?

As regards my proposal to eliminate Euston as a terminus, and to divert its main-line traffic to Paddington and/or a Kings Cross cum St. Pancras on which Mr. Kenneth Brown comments in your April 22 issue, we are told that Euston must be rebuilt and the grouping of the services at other terminals as an alternative would be more convenient to the public and might cost little if any more. The service of electric trains at Euston could be retained and extended as a through route under the "New Railways for London" plan. The present Euston terminus might become a goods station and release the St. Pancras goods for carriage sidings or other purposes—there should be no difficulty in working an infrequent goods service up Camden bank, or perhaps Euston could be given over entirely to electric suburban services. St. Pancras seems to suffer from poor "underground" facilities; an improvement could be made by a bridge over the Pancras Road at platform level to Kings Cross.

My only knowledge of the "New Railways for London" plan is the survey in your issue of July 8. One point strikes me straight away—except for extensions of existing lines, why build any more small tubes at all? Your point about an opportunity missed at Victoria could be easily overcome by making both lines C and D full size and terminating them in a physical connection with the Southern at Victoria. Line D, at the other end, should incorporate not only the line to Enfield Town, but also the Edmonton-Cheshunt loop; a double line through a built up area on which there is no passenger traffic at present presumably because conditions at Liverpool Street have reached saturation point.

If line A supersedes the Metropolitan "Widened Lines," then these might be linked with the electric services at Euston and/or extended westwards to Baker Street or Paddington to permit the running of more through trains. Lines J and K should be a full-size extension of the Northern City Line (and the "Widened Lines"?), but not the Northern Tube, and link with the Southern beyond London Bridge.

Is an "express" underground line paralleling the Morden line really justified? Would it not be better to use the tubes for stopping trains in the inner area, and, by relieving the surface railways of this traffic, allow the running of more fast full-size trains to places further out like Raynes Park and Chessington? As an alternative to the southern extension of line C and line E, I suggest the following:—

Line B be extended to a junction with the Southern Region

near Denmark Hill and all traffic from Crystal Palace High Level, Shortlands via Crofton Park, and Greenwich Park (and/or Lewisham?) be diverted to the Bakerloo tube. This would also supersede the extension of lines J and K, which could be used for other suburban traffic normally running to London Bridge, etc. (see suggestion above).

In place of "E" a small tube from Kennington via Brixton to join with the Southern line at Streatham Hill; then to Crystal Palace (L.L.) and by a new line pick up the Hayes Branch or run to Addiscombe Road. The junctions at West Norwood, Tulse Hill, and Crystal Palace would pass out of use and the lines to Victoria and London Bridge would be relieved of all traffic from Hayes and the Gipsy Hill line. There could be interchange with the main line at Anerley.

While discussing this neighbourhood it is surprising that there is no station between Balham and Mitcham Junction in a built-up area. Even the latter is on Mitcham Common right away from the people, and the junction itself could well be abolished, the main line being carried straight over the branch instead of round tortuous curves. Could not the working of the Wimbledon-West Croydon line via Mitcham be simplified after the manner of the Swansea & Mumbles Railway?

A better route for line F would be from Marble Arch via Paddington to the proposed junction at Neasden, as Paddington's underground facilities are not good. Alternatively a junction at St. Johns Wood would be shorter. In this case, Marylebone might be abolished as a terminus, main-line trains being diverted to Paddington, and through platforms provided at Baker Street. A useful improvement at Paddington would be the slight diversion of the Central Line at Lancaster Gate to serve the terminus. Even now there are not a few who prefer the walk to Lancaster Gate to a change at Oxford Circus from the peripheral Bakerloo Line.

If the Western Region main line is to remain steam-operated, then this leaves steam in its most favourable conditions—level track—but this should not mean a mediocre train service. Would it not be possible to run a "two point" service all day with trains every 30 minutes? I suggest all stations to Slough, taking not more than 45 minutes, and Slough non-stop, and all stations to Reading, and a connection to all branches with every train. The inner service would operate from the suburban station at Paddington, and, except when required for workmen, some of the inner stops at places with alternative facilities (Westbourne Park, Acton, West Ealing) could be omitted. The outer service would use the "main" between Paddington and Dolphin Box, Slough. A train every 30 minutes on the relief should surely leave "paths" for freight trains, and in the up direction there are plenty of loops if these run late. In the rush period there could be a "four-point" service: (1) All stations to West Drayton and Uxbridge with a connection to Staines; (2) West Drayton and stations to Slough and Windsor; (3) Slough and stations to Maidenhead and High Wycombe; (4) Maidenhead, Twyford, the Henley branch, and Reading. Consideration might be given to the adoption of electric or other control system allowing the trains to be driven from either end: this would eliminate light engine movements when "running round." This has been done successfully in the Paris area.

It is evidently considered that other areas should have priority, but in the western suburbs the continuation of the District and Central lines alongside the main line from Ealing Broadway to West Drayton, or even Slough and Windsor, would seem logical eventually; and a new line might be built from Hounslow to Slough following the developed area along the Great West and Bath roads.

In the south-west, has the possibility of handing the traffic of the Kingston Loop and Shepperton branch to the District Line (via Wimbledon and Richmond) been considered? Some works would be necessary, but not a lot, and the L.S.W. main line could then carry more trains for Raynes Park, Chessington, etc.

Another matter deserving attention is the proper integration of rail and road services. For instance, road services should not parallel a railway or tube. To take an example, there are several bus and tram routes which run directly over the Morden Tube from Tooting Broadway to Kennington. One can see the need for these road services in the peak periods, but are they really necessary at other times? Passengers from outer districts (Mitcham, St. Helier, etc.) might well change to the tube at Tooting, and local traffic along the route use it too. The same is true of many Green Line coach services: these could well transfer their passengers to rail or tube at suitable points. For example, coaches up the Great West Road could terminate at Osterley underground station, at least in the off-peak period, and save a lot of traffic from the Central Area streets.

The rejection of the proposal to abolish Charing Cross and Cannon Street bridges and stations is unquestionably right. The outcry against them has been caused mainly by their unfor-

tunate architecture and the association of the arches of the viaducts with seamy surroundings. But a railway can be every bit as beautiful as a road. Likewise, the cry for vistas round churches and cathedrals fails to take into account that religion is not a thing apart, but part of the everyday life (at home and at work) of the people. In the Middle Ages, when most of these great buildings were made, they were clustered about with the homes and workshops of the people.

Yours faithfully,

R. G. R. CALVERT

Lime Street Station, Liverpool

British Railways, London Midland Region,
Euston House,
London, N.W.1. September 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Your correspondent, Mr. D. J. W. Brough, who complains of the shortcomings of Lime Street Station, Liverpool, is your issue of September 16, may rest assured that the London Midland Region authorities are well aware of certain deficiencies at that station, and plans for improvement are already in hand.

The repainting of the station has already begun, certain improvements are being made to the waiting rooms, and proposals for the provision of better directional signs are being examined.

Yours faithfully,

GEORGE DOW,
Public Relations &
Publicity Officer

Passenger Fares

Rustington, Sussex. September 23

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—After reading Mr. Medwyn Ormerod's letter in your September 16 issue, one is left in doubt as to whether he is employing a particularly subtle brand of irony, or whether he really thinks that "maximum integration and economy" achieved by the "closest technological review" will be so great as to enable nationalised transport to pay its way—including proper provision for depreciation as well as interest on Transport stock—without increasing any of the existing charges. Be that as it may, it is a fact that many people, including a number of writers in the public press, regard as "heresy" any suggestion to increase road transport charges, particularly fares, notwithstanding, or possibly on account of, the fact that these charges, almost alone, remain substantially at pre-war levels.

Can Mr. Ormerod, or anybody else, give convincing reasons why the users of road transport should be exempted from the general rise in the cost of commodities and services resulting from the 1939-1945 war? The reasons why road services can be run at a good profit at pre-war charges whilst the railways with charges 55 per cent. above pre-war are unable to pay their way, are not far to seek. Some people ascribe it to superior management on the part of the road companies, but without disputing that most of the large road transport companies are efficiently conducted—as also are the railways—the reasons for their successful financial results are, probably, that, unlike the railways, they have no vast systems of permanent way, signalling, stations, etc., to maintain at practically double the pre-war cost. The only contribution, and that a very small one, that the road companies make towards their permanent way, signalling, etc. (the public highway), is in the form of their Road Fund licences and even these remain at the pre-war level. Secondly, the road vehicle fuel costs have increased by only about 50 per cent. as compared with pre-war, whereas the railways' coal bill has gone up about 200 per cent. Thirdly, the effect of the increased charges which the railways had to impose to meet the foregoing increased costs was to divert to road a very large volume of traffic—particularly passengers—which the railways could and should have carried.

Road transport is thus receiving a direct subsidy from the taxpayer and ratepayer in respect of its "permanent way, etc.," towards the interest on capital cost and upkeep of which it makes only a relatively small contribution; and an indirect subsidy from the railways in regard to traffic diverted from rail to road on account of the higher charges the former were forced to make.

In these circumstances, what reasonable objection can there be to a moderate increase in road charges concurrently with a reduction in rail charges to the new road levels, together with the pooling of the rail and road receipts and expenses, so that nationalised transport as a whole may be enabled to carry out its statutory obligations?

Yours faithfully,

J. R. LAUNDY

The Scrap Heap

OVER THE GARDEN WALL

When a goods train and a light engine came into collision at Leicester on September 24, the locomotive of the goods train crashed through a parapet and fell nearly 30 ft. into a yard. The driver and fireman were thrown into the rear of a shop, but were not seriously hurt. The light engine was derailed and the driver injured, though not seriously.

100 YEARS AGO

From THE RAILWAY TIMES, Oct 6, 1849

AMONG the remedies now forcibly recommended for railway depression, is the augmentation of fares. If the suggestion be practical, the difficulty is equally so. It is of no use to blink it: the Parliament and public opinion are against the measure, and the reluctance of the one, and the bellowings of the other (through the Thunderer's help), will have to be encountered with at least as much audacity as patience. In their eagerness to secure the "monopoly" (as railway traffic is not unfrequently termed), Railway Directors would have engaged to carry upon terms not very much more productive than those of the most "ruinous sacrificers" or of the competing FIGAROS, who engage to shave for nothing, giving an anti-Matthewian bonus to the shaver. If this be regarded as being in any degree an exaggeration, we beg leave to appeal to the present competition between the London and North-Western and the East Lancashire Railway and Canal. An ingenious contemporary has estimated the anti-profit of this opposition at 860 per cent.

GRAPES OF WRATH

Signals and telephone messages sent out by railway officials in South-Western France failed to locate a Toulouse-Albi train which was half-an-hour behind schedule. The answer was given by passengers on their arrival at Albi. Gay harvesters had thrown bunches of grapes at the engine driver as the train passed through vineyards near Tessonnières. Angered by their frivolity, he stopped the train and chased them for 30 minutes before honour was satisfied.—From "The Daily Telegraph."

Lancaster & Carlisle Bridge



Underbridge on the London Midland Region main line between Oxenholme and Grayrigg, bearing a Lancaster & Carlisle Railway inscription of 1846

Photo]

[G. A. Hookham

CARRIAGE LABELS

The colours of the new standard window labels for British Railways coaching stock are:—Red for "No smoking," green for "Ladies only," and blue for first class compartments. The labels are being used on new vehicles and those being repainted. Ultimately they will be used on all vehicles when existing stocks of the former railway companies' labels are exhausted.

RAILWAY COOKING

Monsieur Andre Simon, President of the Wine & Food Society, who has agreed to become President of the London Academy of Chefs-de-cuisine, considers English cooking the worst in the world. . . . The decline in our standards is tragic, he says; forty years ago if you wanted a perfectly grilled steak or chop you had to travel from London to Scotland on the Great Northern. Nowhere else in Europe could such a meal be had! —John Bouverie in the "News Chronicle."

"BRITISH TRANSPORT" EXHIBITION

Over 3,000 people a day have been visiting the "British Transport" Exhibition at Charing Cross London Transport Station. Opened on September 9 by Mr. Barnes, Minister of Transport, the exhibition presents in graphic form the main features of the British Transport Commission annual report for 1948 and reviews the development of the public transport services of this country over the past 300 years. The exhibition will remain open daily until Sunday next.

PRIVATE ENTERPRISE

The flap of an envelope recently received from the Wabash Railroad of the United States bears the following wording: "The finest tribute to private enterprise in this country is paid by this simple fact: The



LADIES ONLY

FIRST

New standard carriage window labels,
British Railways

enormous railroad industry is prepared to handle any emergency in times of peace or war."

ARTY LION

The British Railways badge is now to be seen on some London suburban trains. The design is in bright yellow and includes a wheel, a rectangular label, and a rather arty lion. It is based on a seal designed by Mr. Cecil Thomas, a sculptor who has done much seal-cutting. The seal may be more successful than the badge, which has an odd appearance of out-of-date chic. One feels that it would have been the last word sometime in the nineteen-twenties. The lion, indeed, seems to be a cousin of the old Wembley lion, and, like him, is represented in profile, though the heraldic English lion (there is no "British" lion) is "guardant"—looking at the spectator. —From "The Manchester Guardian."

WORKING TO RULE

When men are moved to mess about
And throw a spanner in the works,
Small wonder that the old machine
Goes, if at all, in fits and jerks.

Whatever else I may forget
Of all the things I learned at school,
One precept still is crystal clear;
They christened it "The Golden Rule."

"Do unto others as you would
That other folk should do to you"
Will work today as in the past
When tried by honest men and true.

Life's based on reciprocity;
It works both ways—for goodness' sake
Let's see each others' points of view
And learn to give as well as take.

One hasty, unconsidered word,
And we may find ourselves alone;
Let's cultivate our commonsense
And set sweet reason on her throne.

Then, when these differences come,
As come they will, we'll all keep cool,
And, ere we drop too many bricks,
Make sure we work "The Golden Rule."

A. Y. Z.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Vryburg-Ramathlabama Section Offered to South Africa

The Southern Rhodesia Government has offered to sell to the Government of the Union of South Africa the portion of the Rhodesia Railways system which runs through Union territory between Vryburg and Ramathlabama (112 miles) on the Bechuanaland border.

New Railway Act

The "Rhodesia Railways Act 1949" of the Southern Rhodesia Government has been published, but the "Higher Authority" to be established in terms of the Act will not come into being until the Northern Rhodesia legislative assembly has passed the necessary complementary Ordinance. It was anticipated that this would be done by the end of September.

When the legislation becomes effective the four who will comprise the "Higher Authority" are:—The Prime Minister of Southern Rhodesia (Sir Godfrey Huggins), the Governor of Northern Rhodesia (Sir Gilbert Rennie), the High Commissioner for the Protectorates (Sir Evelyn Baring), and the Southern Rhodesia Minister of Mines & Transport (Mr. G. A. Davenport). Though not yet functioning under the Act these four gentlemen have already held a preliminary meeting at Salisbury in consultation with the present chairman and general manager of the Rhodesia Railways.

Finance

Receipts for the month of June (including the Beira and Shabani Railways) totalled £961,598 less expenses £693,304, giving a net operating revenue of £268,294. This brings the net operating revenue for the first quarter of the current financial year up to £883,294, being an increase of £236,999 over the figure for the corresponding months of 1948.

PORTUGUESE EAST AFRICA

Beira Port and Railway

The Mozambique Railway & Harbours Administration has called for tenders for the construction of a new wharf at Beira with equipment for the handling of mineral and oil cargoes.

Tenders are also being invited for the supply of 12 engines and a fairly large quantity of other wagons, coaches, and tank wagons to replace the Rhodesia Railways stock at present being used between Beira and Umtali.

NYASALAND

New Lake Vessel

A new ship designed to carry 368 passengers and 100 tons cargo, is nearing completion for service on Lake Nyasa.

New Locomotives and Rolling Stock

Two of the eleven new engines ordered for the Trans-Zambesia and Nyasaland railways have arrived. They are of the 2-8-2 type, built by the North British Locomotive Company, Glasgow.

New rolling stock on order for delivery before the end of 1949 includes 50 open wagons to be followed by 50 closed wagons and 6 petrol tank wagons. New

passenger stock is expected to be delivered in 1951.

Traffic Position

Mr. H. W. Stevens, the general manager, has announced that the back-log of traffic which had accumulated six months ago is rapidly disappearing. Imports (excluding railway material and coal) conveyed during the first half of the current year totalled 37,173 tons thus exceeding the "target" by 28 per cent. Exports conveyed by rail to Beira amounted to 17,355 tons.

MADAGASCAR

New Lines

Of two new railways to be built as part of the development plans for French colonies, of which details relating to French West Africa appeared in our issue of September 30, one would be from the port of Soalara, on the west coast, to the Sakoa coal mining zone, 99½ route-miles, to facilitate the export of the coal. The second line would be 25 miles long and an extension of an existing branch of the Tananarive-east coast railway.

CANADA

All-Aluminium Box Car

The first box car with an all-aluminium body, a new development in railway freight equipment, was displayed recently to officials of the Canadian National Railways at Central Station, Montreal. It has been designed and built by the Aluminium Company of Canada, and will go into service on that company's Roberval & Saguenay Railway as an experiment. It is believed to be the lightest wagon of its size and type in existence, at 34,400 lb., and its capacity is 134,600 lb.

ARGENTINA

New Wage Scales for Railway Employees

All railway employees in Argentina are benefited by new uniform wage scales applicable to all lines, recently introduced with retroactive effect to June 1 last.

Considerable increases in salaries and wages have been granted, particularly to first-class engine drivers, whose maximum remuneration has been increased by over 70 per cent., from 700 to 1,200 pesos.

Station workers have been divided into three classes, each with a minimum monthly salary of 400 pesos, rising after 25 years' service to 1,200 pesos (1st class), 1,050 pesos (2nd class), and 950 pesos (3rd class). For the first time, the maxima for administrative staff will be lower than those for station staff, i.e., 1,050, 900, and 700 pesos respectively. Labourers will receive a minimum wage of 400 pesos, rising to 550 pesos after 25 years. In workshops, specialists will receive a maximum of 1,100 pesos, skilled workmen 1,000 pesos, and semi-skilled workmen, 900 pesos.

It is logical to presume that fares and freight charges will have to be increased once more to enable these generous wage increases—roughly 50 per cent. in most cases—to be paid without loss.

Express Goods Services to Bahia Blanca

Following the recent speeding-up of goods services on the General Mitre Railway, the General Roca Railway has introduced a new express goods service between Buenos Aires and Bahia Blanca, covering the 640 km. in 16 hr. 45 min., as against 31½ hr. previously.

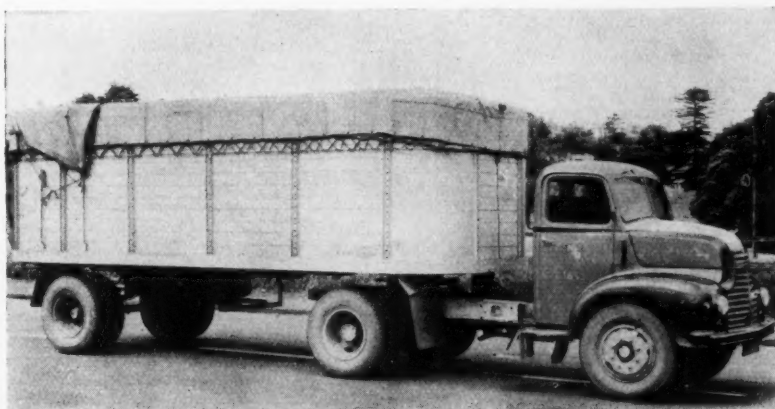
Buenos Aires Transport Corporation to be Controlled by Ministry of Transport

A recent decree of the Argentine Government provides for the control of urban transport in the Greater Buenos Aires zone to be transferred to the Ministry of Transport from the Ministry of the Interior. The Transport Control Committee of the City of Buenos Aires will therefore become part of the first-named Ministry. The Buenos Aires Transport Corporation is in the process of winding up, but there is no indication as yet regarding the régime which will replace it.

Through Working Between Railways

Apart from the increasing use of through coaches between stations on different railways, the new régime of operation has made it possible to run complete through trains between points on different systems, utilising locomotives and rolling stock belonging to the railway of origin, as with the following services, among others:

New Zealand Railways Road Services



A Leyland Comet articulated vehicle of the New Zealand Railways, in service between Auckland and Paeroa

Rosario (Mitre) and Bahía Blanca (Roca); Córdoba (Mitre) and Villa Mercedes (San Martín); and Bahía Blanca (Roca) and Huinca Renancó (Sarmiento).

Railway Workshops to Accept Outside Work

Railway workshops have been authorised to accept engineering work from outside wherever it is possible to do so without prejudicing the requirements of the railways.

New General Roca Railway Branch

The industrial branch of the General Roca Railway between General Madariaga and the growing seaside resort of Pinamar has been converted into a full passenger-carrying line, and a diesel coach service has been introduced to connect with the passenger trains between Buenos Aires, General Madariaga and Mar del Plata.

GERMANY

New Station Building at Bochum

Early in September, the rebuilt station building at Bochum was opened to the public. This is the first station building in North Rhine-Westphalia (British Zone) to have been entirely rebuilt, not merely reconstructed, since the war.

Bridge Reconstruction

After more than two years of rebuilding, the permanent bridge carrying the Stuttgart-Mannheim double-track main line across the River Enz near Bietigheim (Württemberg) to the west of its confluence with the River Neckar was completed early in September, and has now been opened to traffic. Bietigheim Bridge is one of the largest and most important in

Western Germany as the line carries also a large proportion of the traffic between Munich and the Rhineland. Bietigheim (Württemberg) is 14½ route miles north of Stuttgart main station, and an important junction (Stuttgart-Karlsruhe and Mannheim, Stuttgart-Heilbronn, Bietigheim-Backnang, on the Stuttgart-Nuremberg main line).

Allied Military Traffic Paying Higher Rates

The increase in the goods and live-stock rates of the Federal Railways introduced on August 16 has not been applicable to the Allied military traffic. Efforts by the Federal Railways to obtain an equal footing between the civilian traffic and the Allied military traffic have been successful and the higher rates are applicable to the latter as from September 1.

U.S.S.R.

New Goods Locomotives

Further particulars available of the two new types of goods locomotives outlined in the article published in *The Railway Gazette* of August 19 differ somewhat from some details mentioned in that article. It is, therefore, thought advisable to rectify the original data received from Moscow by substituting for them new data received from Belgrade.

The articulated locomotive built by the Kuibyshev locomotive works of Kolomna has the wheel arrangement 2-6-0+0-6-4, with four outside cylinders, each two close in front of the leading driving wheels of each group of six. The leading pony truck is pivoted and the trailing truck is rigid. The negotiation of curves is stated to be greatly facilitated by this arrangement. All other particulars of this locomotive as published in the article

referred to above were confirmed as being correct.

The wheel arrangement of the locomotive built by the "October Revolution" locomotive works of Voroshilovgrad is now given as 2-10-6. The locomotive has two outside cylinders, each located above the third driving wheels. The reciprocating movement is transmitted by a link motion forward of the cylinder reaching down at the sides of the second driving wheels and connected with the third driving wheels. This novel arrangement of the mechanism is said to be instrumental in reducing hammer blow and in minimising the dynamic stresses produced by the mechanism to the minimum.

The six-wheel truck supporting the fire-box has an outside frame, and so has the four-wheel truck of the Kolomna-built locomotive.

The tender of the Voroshilovgrad-built locomotive has 14 wheels, but no details have been obtained as to their grouping in bogies. The other particulars published in regard to this locomotive are confirmed.

ALBANIA

Industrial Branch Line

A Moscow report states that an industrial standard-gauge branch line, 4½ miles long, connecting the Durazzo-Tirana line with the expanding industrial quarter of the Tirana, was completed early in September. The junction between the branch and the Durazzo-Tirana line is at Kashar, the first station west of Tirana. Some 2,000 youths from all over the country took part as voluntary labour and in turns in the building of the branch. The building of the Durazzo-Tirana line, mentioned in *The Railway Gazette* of April 30, 1948, was completed some time ago.

Publications Received

Deutschland Jahrbuch, 1949 (Germany Yearbook, 1949). Edited by Dr. Klaus Mehner and Dr. Heinrich Schulte. Essen, West Verlag. 196. Rütterscheiderstrasse. 9½ in. × 6½ in. 502 pages, numerous tables.—In fairness to those would-be readers of this book whose interest is confined to railway subjects proper it must be stated that no more than four pages are devoted to their particular interest. The book nevertheless deserves mention, because no one interested in any branch of public life can afford to ignore such a valuable work on post-war conditions in Germany. A wealth of factual material, compiled by leading personalities in their respective fields, has been assembled on all aspects of German activity from May 7, 1945, to the autumn of 1948. This exhaustive review of political, economic, commercial, social, and cultural conditions in a defeated and largely ruined country is all the more impressive because of the obvious difficulties under which this fact-finding effort had to be carried out.

The chapter dealing with the German railways, after referring to the administrative reorganisation and to inter-zonal traffic arrangements, surveys the extent of damage and destruction suffered during the war and through the subsequent dismantling of lines in the Russian and French zones of occupation. It describes the measures taken in the reconstruction work of the last few years and the results obtained. Some interesting details are quoted; for instance, to overcome the great shortage of goods wagons, the

authorities succeeded in speeding up the wagon round-trip time from nine days, in 1946, to 5.9 days in 1948, by applying rigorous rules, and enforcing loading and unloading at all times of the day and week. As far as passenger traffic is concerned, the wholesale destruction of the towns, the re-settlement of the population, the continued separation of families and the widespread foraging for foodstuff resulted in an unprecedented traffic boom which, before the currency reform in June, 1948, reached a figure four times as great as in 1936. This traffic had to be handled with only 60 per cent. of the pre-war rolling stock, so that there was heavy overcrowding. The money shortage after the currency reform resulted in a considerable traffic decrease. The book also deals briefly with the financial aspects and staff problems of the German railway administration.

All Stations to Manchester! The Centenary of the Huddersfield & Manchester Railway and Standedge Tunnel. By Stanley Chadwick. Huddersfield: The Venture Press, 38, Byram Avenue, Westgate. 9½ in. × 7½ in. 24 pp. Illustrated. Stiff paper covers. Price 1s. 6d.—To mark the centenary of the opening of the railway between Manchester and Huddersfield, on July 13, 1849, Mr. Chadwick has expanded one of his earlier pamphlets, "Through the Backbone of England," into a separate booklet. Chapters are devoted to the promotion and construction of the railway, and to Standedge Tunnel, the most notable engineering feature of the line. The tunnel is 3 miles 62 yd. long, and was the longest in the country at the time of its construc-

tion. It now stands third in the list of longest British tunnels. The original single-line tunnel sufficed for many years, but was supplemented by a second single-line bore in 1871, and by a double-line tunnel in 1894.

Flexural Fatigue Strength of Steel Beams, a report on recent investigations at Illinois University, by Wilbur M. Wilson, Research Professor of Structural Engineering. Published by the University as Bulletin Series No. 377, illustrated, 9 in. × 6 in. 34 pp. Price 20 cents.—The experiments reported upon were undertaken to determine the relative fatigue strengths of flexural members in short beam spans as used in the stringers of large through bridge spans or as small bridges, with and without full- or part-length cover plates and stiffeners. A 90-ton fatigue machine was specially adapted to test flexural specimens. The load was applied through a lever to the test pieces by means of an adjustable-throw eccentric on a motor-driven shaft, thus subjecting the flanges to cycles of flexural stress. The load was measured with an open-loop dynamometer and the stresses were thus computed. Results showed greatly reduced fatigue strength in an I-beam due to abrupt changes in section at the ends of part-length cover plates, when attached by continuous longitudinal fillet welds. Plain R.S. beams had much higher fatigue strength than welded fabricated beams or rolled beams reinforced with welded stiffeners or even full-length cover plates, whether continuously or intermittently welded. Riveted reinforcement was also tested *vide* editorial note on page 406.

Locomotive Valves and Valve Gears—2*

Laying out a Walschaerts gear, the application of Poppet valves, and valve gear lubrication

By Geo. W. McArd, A.M.I.Mech.E.

BEFORE a new gear can be designed, certain determining factors must be settled, remembering that the object before the designer should be a rapid opening and closing of the valve, whether for steam inlet or exhaust. The securing of these features will eliminate wire drawing and consequent loss of power, but no link or radial gear yet devised affords the results which may be obtained by using the poppet valve and its special mechanism—such as the Caprotti, the Franklin, or the

to obtain the centre of the return crank pin relatively to the reversing link swing.

The first members to be located should be the combination lever and crosshead arm and their connecting link. In Fig. 13 are shown the two types of lever used, that at "A" being for use with outside admission valves and that at "B" for inside admission. The flat slide-valve naturally falls into the first category and the modern piston-valve, in which the live steam is restricted to the space between the two

may be affected by the dimension "g" in the combination lever. On large engines, no trouble is experienced in finding a suitable value for "g," with a short crosshead arm, yet long enough to prevent the connecting link fouling the slide-bars in any position. For smaller locomotives, "g" will have to be made large enough to house suitably the pins required for valve spindle and valve rod attachments, and the crosshead arm then will require to be long enough to link up with the bottom pin of the combination lever; the ideal position for the connecting link is parallel to the cylinder centre-line, when the main crosshead has travelled through a fourth of the stroke from either end. Care must be taken to check the clearances between the combination lever and the cylinder studs, as well as the

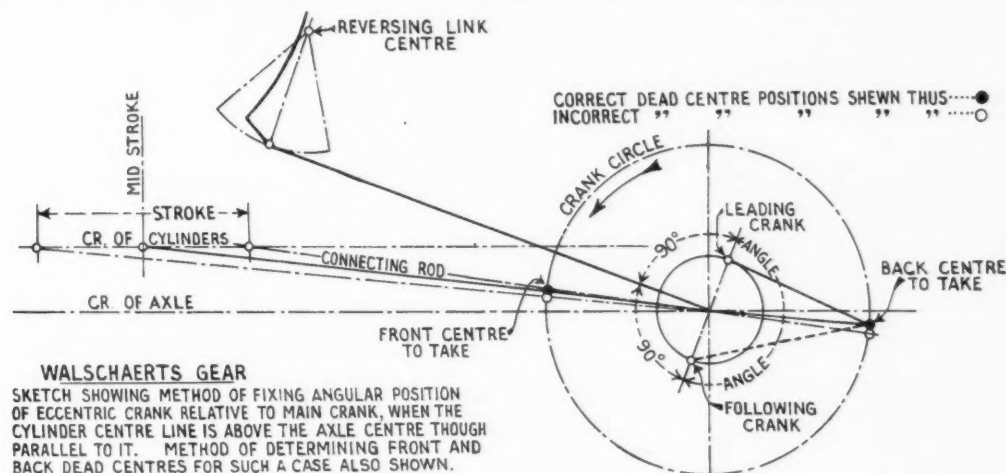


Fig. 12—Diagram showing method of determining true dead centres, and position of return crank relative to main crank

Lenz. On the other hand, these mechanisms are somewhat complex and call for careful maintenance by squads more familiar with the ordinary valve gears and who have relatively little, if any, experience of the vagaries of a poppet valve mechanism.

The development of a valve gear is largely a draughtsman's job when the main requirements have been settled, and as the Walschaerts motion is possibly the most widely used, the method used will be described.

Developing a Valve Gear

The main lines on which the gear is to be built will be drawn down—preferably one-fourth full size—and will include the motion centre lines, on which the cylinder essentials will be shown, that is, a section through the cylinder and steam-chest with all covers, piston with rod and crosshead—in full forward position—valve and valve spindle and guide, and all frame stretchers affected, particularly the slidebar bracket or motion plate.

Where the cylinder and motion centre lines are horizontal, but the cylinder centre is raised above the level of the driving axle centre, some difficulty has been experienced occasionally in determining the true front and rear dead-centres. The correct method is illustrated by Fig. 12, in which the difference in the two horizontal centres has been exaggerated. The same figure also explains diagrammatically how

valve heads, comes into the second. Where a piston valve is used, that exhausts the steam between the heads, the combination lever to use naturally is that shown at "A."

Whichever type is to be used, the position of the intermediate pin centre will be fixed so that "g" is to "G," as twice the sum of the lap and the lead is to the piston stroke, and the total length of the lever will be determined by the height of the valve spindle above the cylinder centre line and the distance below the latter, for the most suitable connection to the crosshead link.

In settling this point, the crosshead arm length will be involved, and this in turn

packing glands, when the crank is on the front dead-centre.

Where the vertical distance between the centres of the cylinder and the steam-chest is large enough, it is possible to dispense with the crosshead arm altogether, though still obtaining correct proportions for the combination lever. In such a case, the crosshead link will connect the bottom end of the combination lever to an extension of the main-crosshead gudgeon-pin, and this method frequently is used in American locomotive design.

The angle of oscillation of the combination lever usually will be fixed by local conditions and dimensions, as referred to above, but this movement should be

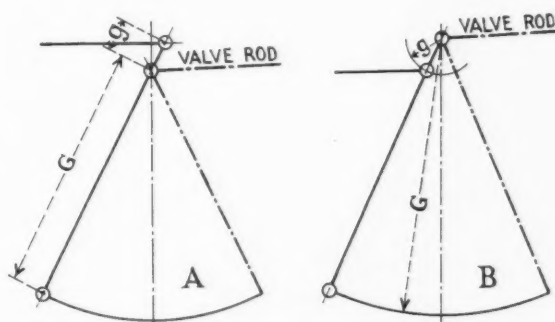


Fig. 13—Combination lever proportions

* Part I appeared in our September 30 issue

checked, and it is recommended in many quarters that this value should not exceed 60 deg. Occasionally the angle formed by these two members is found to be much too flat when the crank is on the rear dead-centre, and careful attention should be paid to the design at this point.

Reversing Link Position

The reversing-link position can be settled now, as well as its preliminary design; the former should be approximately midway between the combination lever mid-position and the driving axle, and when possible, is placed vertically with its trunnion centre at the same height above the motion centre line, as the point of attachment of the valve (or radius) rod to the combination lever, when the piston is at the end of its stroke. The radius of the link is struck from this same point when in its mid-stroke position, and the width of the slot will be made equal to the dia. of the die pin, plus from $\frac{1}{4}$ in. to $1\frac{1}{4}$ in., according to the size of the cylinder. The

link should be restricted within certain limits, and from a number of cases examined, the swing ranged from a minimum of 35 deg. to a maximum of 54 deg. Thus a suggested mean to aim for would be around 45 deg., with a maximum under difficult design conditions not exceeding 50 deg.

The following formulæ will enable the dia. of the return crankpin path to be obtained, and the preceding notes will determine the final position of the pin relative to the crankpin. The amplitude of the motion of the die in full-gear position can be found from the formula: $\sqrt{T^2 - 4(L+a)^2}$, where "T" is the total valve travel in full gear, "L" the steam lap and "a" the lead. The dia. of the return crank path circle will be found to bear the same relation to the die pin movement, as the radius of movement of the eccentric rod pin in the link does to that of the die pin in full gear. An alternative method to the foregoing is that given by Mr. B. Spencer in his paper on the design

or lowered to provide the forward or backward movement (or *vice versa*) of the locomotive. This may be accomplished by a lifting link, or a pair of side links, connecting the valve rod at some point adjacent to the die pin with the appropriate arm on the reversing shaft. Both points—that on the valve rod and the other on the reversing shaft arm—tentatively may be assumed for a preliminary trial, but almost certainly will call for modification when trying out the gear for the final valve-positions.

An alternative method adopted on many engines is the placing of the reversing shaft behind the reversing link, but on a continuation of the valve rod mid-gear centre line. The operating lever raises, or lowers, the valve rod and the die, by its engagement through similar dies in the slotted ends of the valve rod; in such a scheme, the slip of the die is maintained uniform in both gears, thus appreciably improving on the normal method of reversing, so far as the worst gear posi-

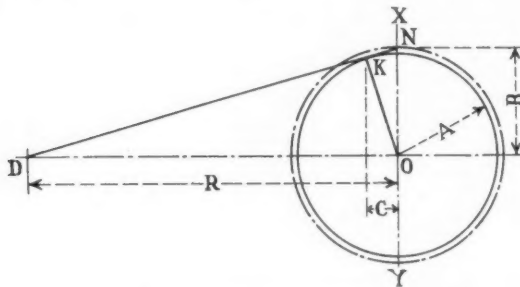


Fig. 14—Diagram for ascertaining movement of pin attaching radius rod to combination lever, inside admission valves

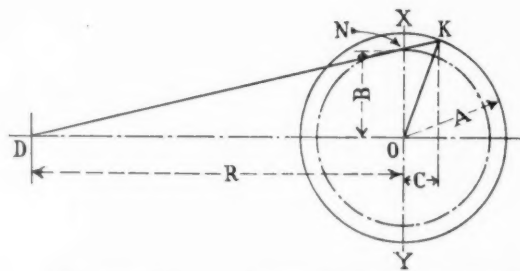


Fig. 15—Diagram for ascertaining movement of pin attaching radius rod to combination lever, outside admission valves

thickness of the radius link and its die should be not less than the joint pin dia., preferably slightly larger.

On occasion, the reversing-link height may be lower than that above specified, so as to accommodate other structural features on the locomotive, and care must be taken concerning the mid-position of the link and valve rod. Under such conditions, the link in mid-gear, as before, must be radial to the joint pin centre of the combination lever and valve rod, the crank being on either of the two dead centres.

An important point of the link design centres around the point chosen for the eccentric rod attachment, and although this may be subject to appreciable change when trying out the gear on the model, a preliminary centre is obtained by dropping a line from the reversing-link trunnion-centre square to the radius rod when in mid-gear and testing a point at the intersection of this line, with a curve struck from the trunnion centre, with the motion centre line as its tangent. To effect a symmetrical movement of the link about its mid-gear position, the eccentric rod pin will need to be offset on the forward side of the position tentatively chosen.

After the correct position has been determined for the eccentric rod joint pin in the radius link, draw a line through its centre and the centre of the driving axle, with another perpendicularly through the axle centre (see Fig. 12). Where the latter crosses the circular path of the return crank will be the centre of the return crankpin—either leading, or following, the driving crank.

The maximum swing of the reversing

link should be restricted within certain limits, and from a number of cases examined, the swing ranged from a minimum of 35 deg. to a maximum of 54 deg. Thus a suggested mean to aim for would be around 45 deg., with a maximum under difficult design conditions not exceeding 50 deg.

By Mr. Spencer's graphical process, to find the movement for valves with inside admission (see Fig. 14), draw OD equal to the main crank radius "R" and with a radius A equal to half the valve travel, strike a circle with O as centre. Draw XY perpendicular to OD through O, and mark off, to the left of O, a distance C equal to the lap plus the lead. From this point erect a perpendicular, cutting the valve travel circle at K. Join DK and produce to intersect XY at N. The distance ON is equal to B, half the required travel of the pin as stated in the last paragraph.

To find the movement for valves with outside admission (see Fig. 15), a somewhat similar construction obtains, but in this case, the distance C is marked off to the right of centre O.

These results are obtained by formulæ as follows:—

For inside admission

$$B = R \sqrt{A^2 - C^2} / (R - C)$$

For outside admission

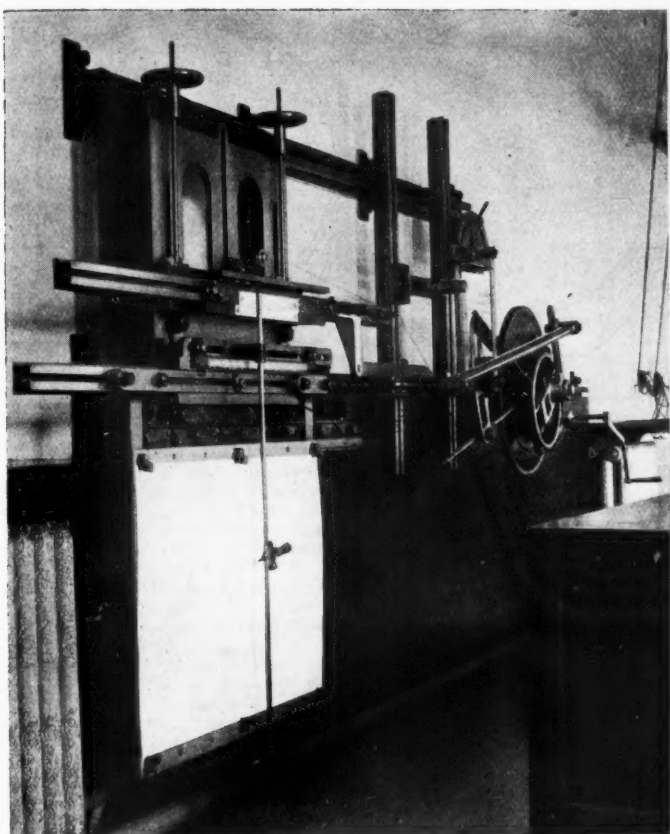
$$B = R \sqrt{A^2 - C^2} / (R + C)$$

The valve, or radius rod, is that member which connects the reversing link through the die, with the combination lever immediately below, or above, the attachment of this member to the valve spindle or its extension, and must be raised

tion is concerned. This position of reversing shaft is good for engines which run approximately equal mileages in each direction (tank engines, for example), but the method of suspension previously described, in which the shaft is above the valve rod, will give much less slip for the die when in position below the trunnion centre, and is a considerably better scheme for express locomotives, which do most work in foregear. The lower position for the die also is better, in that the pressure on the trunnions, due to the eccentric rod thrust, will be much less than when the die operates above the trunnion centre.

The length of the radius rod generally is determined by the development of the gear, but a minimum length recommended by the American Locomotive Company is three times the total travel of the die pin, that is, from full forward to full backward. The minimum length suggested for the eccentric rod is three times the eccentric crankpin throw. By varying the point of attachment of the eccentric rod to the reversing link, the angle in which the lifting link swings and also its length, a marked improvement in steam distribution can be effected. It should be noted, however, that in a correctly designed and constructed gear, it will be possible to swing the valve rod from full foregear to full backgear without any movement to the valve, the piston being in either of the two dead-centre positions.

For all new gears, very careful readings should be plotted, the finals being built in to produce the well-known valve ellipse, unless the valve model has the necessary provision for drawing these. Two methods are used for obtaining the readings referred to; if the designer is fortunate



Valve gear model for full size working, showing drawing board attachment used to obtain valve ellipses

nate in having a full-size model on which he can build up the gear as proposed, he can take measurements of the port opening for every position of the crank and afterwards co-relate these to produce the ellipse, unless the machine will do the job. A model designed by the author is the subject of the accompanying illustration, showing the pencil and drawing board attachment, on which the ellipse is mechanically drawn. After the motion is set up on the model and readings are to be made, a special chart should be available on which the valve movements can be recorded.

Where a model is not available, however, wooden templates may be used with success, and a drawing of the type used by the author for Walschaerts gear layouts (for inside admission valves) was illustrated in *The Railway Engineer* for June, 1930 (page 230). To use these effectively, lay down the main lines of the gear as shown in the figure, including the curves representing the crosshead link end swing and also those for the reversing link, for the several crank positions as numbered. Then place the templates consecutively on the different curves and mark down the valve positions (with each numbered) on the horizontal line representing the valve and port faces.

If the valve ellipse must be drawn by hand, the following method is suggested. Lay down the two vertical lines AA, as shown in Fig. 16, separated by a distance equal to the piston stroke, and draw the circle B to represent the crank path. Divide the latter into as many parts as have been taken when plotting the valve

positions, drop perpendiculars CCC to the horizontal centre line and correct these to $C_1 C_1 C_1$ to allow for the effect of the connecting rod obliquity. Lines $C_1 C_1 C_1$ then represent the positions of

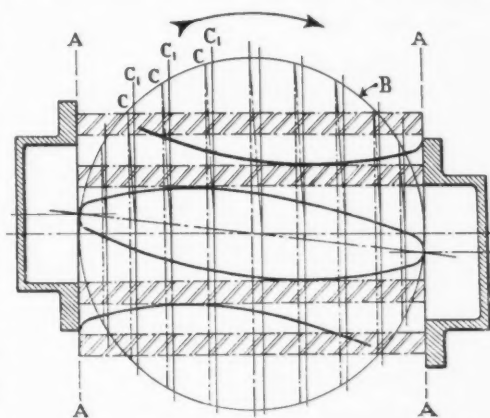


Fig. 16—Method of drawing valve ellipse manually

the piston for the corresponding crank positions, and by measuring the valve movements on each of these, all the points for the master ellipse are obtained. This ellipse (or ellipses, if several degrees of cut-off are to be plotted) now can be applied locally to the several edges of the valve, to obtain the positions of cut-off.

release, and such like, for forward and backward strokes, separate diagrams being produced for foregear and backgear movements.

The ideal gear will have, among other good features, a total absence of slip between die and reversing link in both gears. This frequently is obtainable in full forward-gear, but paid for rather dearly in reverse (or *vice versa*), and it occasionally is possible to effect a compromise in the two gears, by slightly offsetting the trunnion centre of the reversing link from its normal position on the curved centre line of the link. As previously stated, the improvement may be increased still further, by a judicious manipulation of the swing centre for the lifting link, where such is used.

Location of Eccentrics on the Axle

A very important operation in the drawing office, as well as the shops, concerns the method used for locating the eccentrics on the axle. Any one of at least three methods may be used for dimensioning the offset required, and these are shown at "A," "B" and "C" on Fig. 17. Either method should give correct results, but that given at "C" is one that is appreciated in many quarters, as it enables the eccentrics to be set up on the axle, by using the locking screws only and to check up the marked-off position for the keyway on the first engine of a new class, before the keyway is finally milled.

The size of joint pin to use for valve-gear connections usually is related to the cylinder bore, and a value which has given excellent results is $D/10$. The actual size to be taken is to the nearest eighth-inch, a 20-in. cylinder having motion pins 2 in. in dia., but one of 18 in. would have $1\frac{1}{2}$ in. dia. pins.

Several methods are available for securing the eccentric crank to the driving crankpin—apart from combining the two in one forging—and these comprise: (a) a square hole in the crank, fitting over the squared end of the crankpin; a bolt—sometimes two—secures the crank from working off; (b) similar to (a), but in place of a square, a key is fitted in the crankpin circular end; (c) that in which the crankpin end is splined. Fig. 18 illustrates each of the above designs, and type (c) is possibly the most attractive when a suitable broach is available, as for any given load, a somewhat lighter design is obtainable than with any other design except the solid type.

Two types of forked rod ends are illustrated in Fig. 19, and of the two, that shown at "A" is to be preferred, as unless the centre of the radius in type "B" is sufficiently far from the pin centre, the link and rod will jam. This is by no means an uncommon drawing office slip, and it is always better to give slightly more clearance, say $\frac{1}{4}$ in. to $\frac{1}{2}$ in., than the layout on the

board would suggest for the components when these are at the worst angle of their movement.

The ideal valve gear for any engine is one which will open and close the valve instantly at the beginning and end respectively, of the steam inlet and the exhaust period, affording a full opening of the

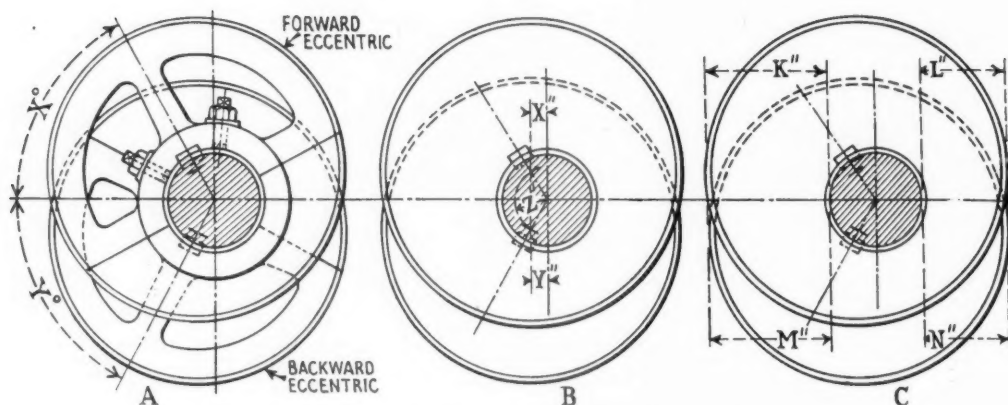


Fig. 17—Alternative methods of drawing eccentric locations

valve for the length of piston stroke, as required for the cut-off selected. No gear which is operated solely by the rotation of an eccentric, can effect this satisfactorily, but the poppet valve can attain the desired result in a comparatively simple manner.

On existing locomotives it is possible to retain the valve gear, and to keep down

steam and exhaust. Accessibility to any of the four valves can be rendered easy, if carefully considered when the juxta is being designed, and to withdraw any valve and its spring should be a comparatively simple operation. Lower fuel costs per engine and reduced lubricating-oil consumption.

Where the original valvegear is re-

lubrication with oil, where grease would derive no benefit. On the other hand, on the same reasoning, it might be argued that oil would be more extravagant than grease, if not actually wasteful.

Where ball, or roller, bearings are used, these usually are fed by grease through nipples, and can be charged at much longer intervals than would be necessary

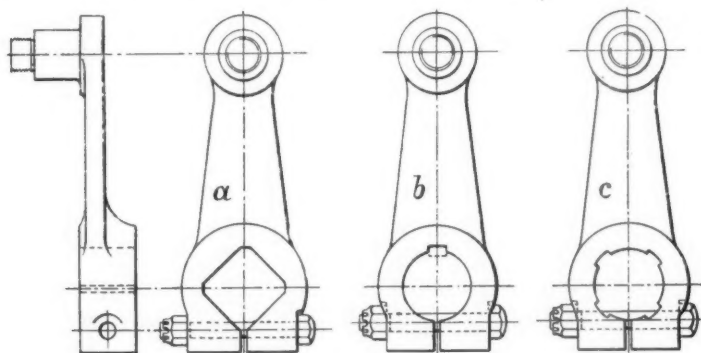


Fig. 18—Alternative methods for securing return crank to crankpin end

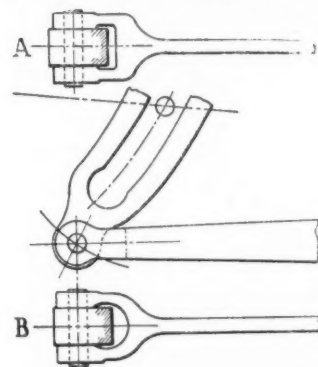


Fig. 19—Alternative design for eccentric rod forked end

the cost of conversion, the cylinders only are redesigned to accommodate the poppet valves. Where new engines are in view, however, the axle-driven gearbox with propeller shaft drive to the cylinder valve mechanism, is the more usual course adopted, cutting out the ordinary types of valve gear entirely. In some cases, the operation is by cams which bear directly on the valve spindle ends; in others, levers are interposed.

Numerous advantages are claimed for the poppet valve application, and a brief summary of the claims made follows. Larger port areas are obtainable than with the piston valve, and therefore considerably greater than with the flat slide-valve. The valves are claimed to maintain steam-tightness longer than do either of the other types and from experience this claim appears to be fully justified; trouble with piston valves commonly is noted in shed reports, which complain of broken rings, carbonisation trouble, and such like. Maintenance costs are much lower, especially where the drive is taken from the driving axle through the gearbox. Lower power is absorbed in the operation of the Caprotti valves, even though four to a cylinder are provided, two each for

tained, the reversing gear also provided will continue to function, but when the drive is the recommended axle-gearbox and propeller shaft, the Caprotti scheme embodies its own reversing, or control, gear. In the cylinders, reversing is effected by sliding into position reversed cams, which give the valves the necessary change of motion; between the full forward and the full backward cams, are a series giving different degrees of cut-off for either direction of running.

All cams and working parts—valve spindle and so on—are carefully hardened and ground, and from returns received, it has been found that wear is extremely small on any of these details, and the effective working life proportionately prolonged.

Lubrication

Valve gear details are frequently oil-lubricated through small oil holes and channels, or oilcups formed on the motion details or the pins. In a few cases "Menno" greasecups have been fitted, but preference for oil still exists in many quarters responsible for the proper maintenance of the engine stock, the theory being held that the motion of the several parts assists in maintaining more efficient

for oil. Roller bearings have given considerable success in many gears, and have many excellent features to their credit for valve gear operation.

(Concluded)

AMERICAN VISITORS TO BRITAIN.—Of the 58,817 American tourists who visited Great Britain up to the end of July, over 1,000 were interviewed and photographed by the Travel Association (Tourist Division of the British Tourist & Holidays Board) as part of a scheme for popularising Britain as a tourist centre in the United States press. The American states which produced the greatest number of visitors were California, 16 per cent.; New York, 10 per cent.; Massachusetts, 7 per cent.; Illinois, 6 per cent.; Pennsylvania, 6 per cent. Cities and towns from which most tourists came were New York, Los Angeles, Chicago, St. Louis, and Washington. The Travel Association's survey also covered tourists' reactions to Britain as a holiday centre, and among those interviewed was a New York housewife who said she had never come across such gracious courtesy from strangers as on buses and trains in England and Scotland.

Line Improvements on the Missouri Pacific Railroad

Two important regrading and realignment works now in hand between St. Louis and Poplar Bluff, Missouri

SOME 60 years ago the Missouri Pacific Railroad initiated what has proved to be an extensive and almost continuous programme of line improvements throughout the north-eastern area centring on St. Louis. These have taken the form of regrading and realignment of all the main and the more important secondary lines, with the object of reducing working expenses and maintenance costs. In some cases, however, they have been necessary to raise formation above flood levels. These improvements are still in hand, two of the most important now being carried out on the south-west main line from St. Louis via Bismarck, Piedmont, Poplar Bluff, and Little Rock.

As a result of regrading in the past, the whole of the St. Louis to Poplar Bluff section has now a ruling gradient in both directions of 1 in 80, compensated for curvature, with the exception of the 51-mile Bismarck-Piedmont sub-section. Over this bottle-neck all the heavier passenger and freight trains have had to be banked or piloted, and six assisting engines are used continuously for this purpose.

Consequently it is here that the two improvement works just mentioned are being carried out to provide a 1 in 80 ruling throughout and dispense with assisting engines. The first is on both sides of Tip Top summit and is already almost completed. This regrading has entailed a seven-

mile realignment costing about £375,000, and has enabled the summit level to be lowered by nearly 100 ft., and the gradients to be reduced from 1 in 41 and 1 in 46½, against southbound and northbound traffic respectively, to 1 in 80 compensated. Moreover, it has reduced the sharpest curve from 10½ ch. rad. to 58 ch., with the exception of two 43½-ch. curves; some 414 deg. of curvature are also eliminated. Another important improvement is a shortening of the length of line by 3,664 ft.

The most important individual work carried out to secure the Tip Top regrading has been the excavation of nearly 2,000,000 cu. yd. of compacted clay, gravel, and boulders to form a great summit cutting 4,000 ft. long and having a maximum depth of 150 ft. This cutting has a width at formation level of no less than 50 ft., said to be necessary to provide adequate space on each side the track for line-side equipment for maintaining the side drains.

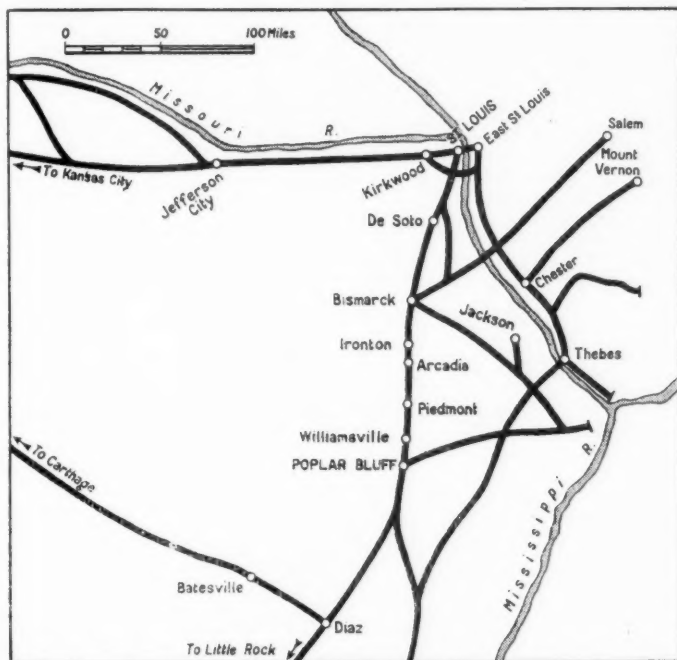
The side slopes are 1½ to 1, doubtless fixed as a result of the fact that the boulders were so firmly embedded that blasting was necessary to loosen them and facilitate excavation, carried out by 2½- and 3½-cu. yd. shovels. Hauling units of 16 cu. yd. capacity were used to remove the spoil, most of which went to form neighbouring fills; the average haul was 6,000 ft. and the maximum 2½ miles.

Another item in this regrading work was a 45-ft. deep rock cutting half-a-mile long; otherwise earthwork was comparatively light. The whole of the work, including laying the track, should be now about complete.

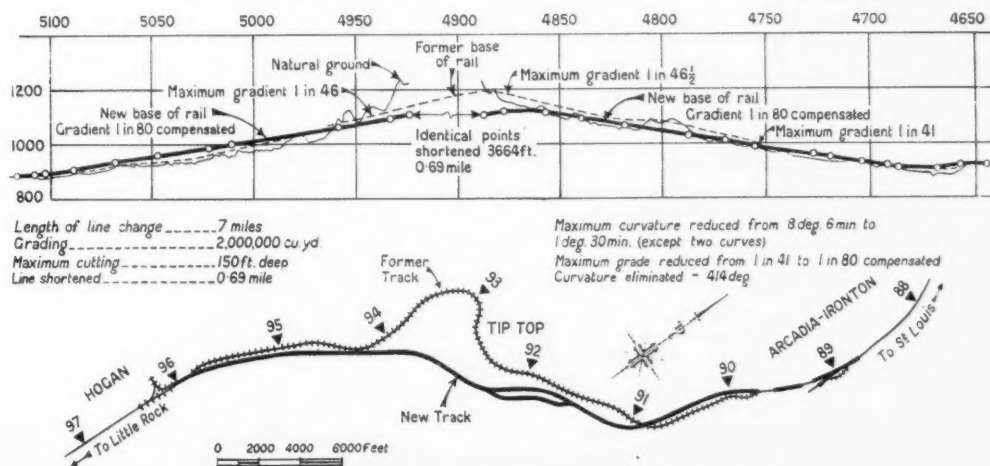
Second Realignment

The second improvement work, near Gads Hill, on the Bismarck-Piedmont section, is not so far advanced, but is also well in hand. It consists of a second realignment, no less than 9.5 miles in length, estimated to cost about £450,000. Though this deviation will reduce the ruling grades from 1 in 55 and 1 in 65 to 1 in 80 compensated, it has another great merit, the elimination of a long detour beside Big Creek, thus reducing the length of line by as much as 2.29 miles. In addition there will be a reduction of 434 deg. of curvature, and the sharpest curve will be 58 ch. rad. instead of 16 ch.

At present, the principal work in hand is the bridgework, consisting mainly of



Sketch map showing the St. Louis-Poplar Bluff section of the M.P.R.R.



Profile and plan of the Tip Top regrading and realignment, with notes on the works involved

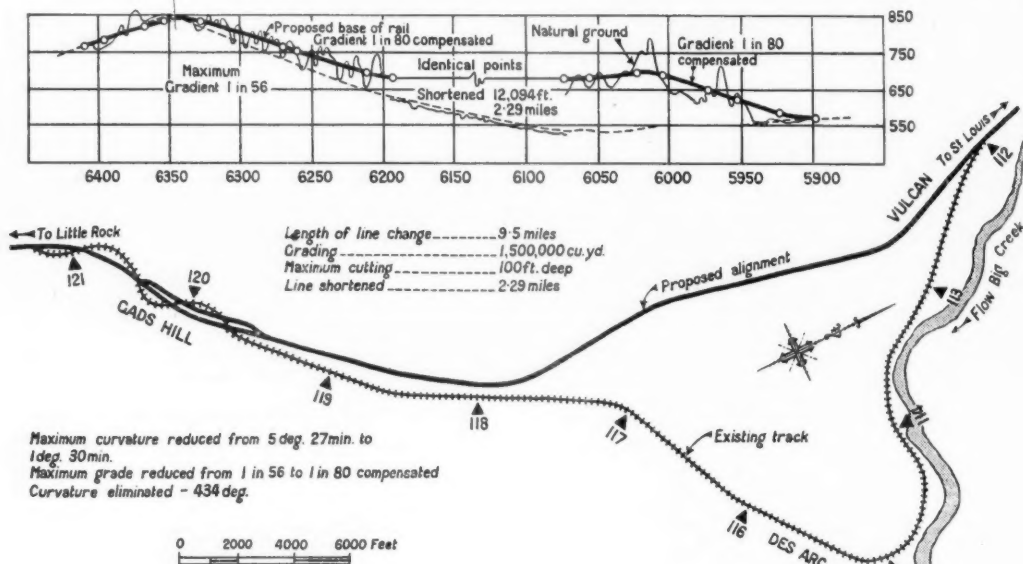
concrete culverts. The quantity of earth to be moved is estimated at 1,500,000 cu. yd.; excavation is mostly in common and solid rock.

On this section of line, therefore, the two improvement works, together costing £825,000, will shorten the line by virtually three miles, reduce curvature by 848 deg. as well as securing 58-ch. curves and 1 in 80 compensated grades in conformity with the remainder of the St. Louis-Poplar Bluff section.

We are indebted to our American contemporary, *Railway Age*, for the foregoing information.



Aerial view of the Tip Top realignment looking northwards towards St. Louis



Profile and plan of the regrading and realignment near Gad's Hill with notes on alterations

INTERNATIONAL MECHANICAL ENGINEERING CONGRESS.—Sixteen countries were represented at the Second International Mechanical Engineering Congress which terminated recently in Paris, and there were observers from the Organisation for European Economic Co-operation. Monsieur Jacobsson, Economic Adviser to the Bank of International Settlements, gave the inaugural address. The theme of the Congress was production efficiency, and

papers ranged from a consideration of the particular, such as "The influence of surface 'roughness' on the cost of manufacture in mechanical engineering," to the organisational problems covered by papers entitled "The introduction of specials into a flow-production line" and "The application of mass production principles in the manufacture of heavy electrical equipment." Mr. A. W. Berry, Director of the British Engineers' Association, read a

paper entitled "The advancement of production efficiency," in which he outlined the many factors in a manufacturing organisation on the improvement of which effort needed to be concentrated to achieve a given technical result. The proceedings included visits to representative engineering works in the vicinity of Paris. Particulars of the 1950 Congress will be available shortly from the British Engineers' Association.

Overhead Equipment Construction Vehicle, British Railways

Two-car self-propelled articulated unit for installation and maintenance of overhead equipment on electrified lines

THE London Midland Region recently has completed a two-car self-propelled articulated unit comprising a repair van and mess van, with driving compartments at each end, for the installation and maintenance of overhead suspension equipment on electrified lines, together with an independent vehicle for unreeling contact and catenary wire. Some new features are based on experience gained on the Manchester, South Junction & Altrincham electric line, where it has replaced repair cars in use since electrification in 1931. Although used only on this section for the time being, it is capable of much wider application.

To avoid use of new material, the underframe, bogies, and two power units driving on to the centre bogie with control gear were obtained from the two end units of the experimental three-car articulated diesel unit operated by the L.M.S.R. from 1938 onwards and since withdrawn from service: the main portions of the coachwork consist of reconditioned bodies. All power for lighting, heating and auxiliary

services is obtained from a diesel generating set originally supplied for A.R.P. purposes. The general design is based on the maintenance of overhead suspension equipment in the minimum time with as little obstruction as possible of normal traffic working.

The unit is propelled by two 125-h.p. diesel engines driving on to the articulated centre bogies through Leyland (Lysholm Smith) hydraulic torque converters, reverse gearboxes, and final drives. The gears are of double-reduction type, in which the bevel pinion engages the two crown wheels, either of which can be engaged with a sliding spur pinion to give a change of direction of motion. This arrangement provides excellent slow running qualities essential for overhead equipment maintenance work, and also smooth acceleration from start up to 35/40 m.p.h.

Compressed air for engine control and brakes is obtained from six compressors, four of which are engine-driven and two electrically-driven from a 12-cell lead acid battery, the latter for use during

starting and emergency only. The engines are started by remote control from the driving cab, and both are controlled simultaneously by a self-lapping throttle valve. Electro-pneumatic control is provided for the torque converter clutches, reversing, etc. The usual water level, oil circulating indicators, and cooling thermostats are installed. Each engine may be started or stopped locally.

A straight air brake with emergency features automatically applies the brake in case of failure of the air supply. A graduated application is secured by means of self-lapping valves located in the driving compartments. The two brake shoes on each wheel are applied by means of a local 5-in. dia. brake cylinder, and a hand brake at each end of the train operates on the wheels of the end bogies.

The driving compartments contain, in addition to the control gear, an adjustable seat for the driver, a pneumatically-operated windscreen wiper, an electrically-heated windscreen de-froster, and a microphone and speaker for communication with overhead equipment personnel working on the unit. They have been designed to facilitate visual examination of the overhead equipment *en route*.

The construction vehicle has a continuous flat roof approximately 5 ft. 4 in. wide at 11 ft. 11 in. nominal height from rail level, and approximately 130 ft. long.



General view of British Railways overhead equipment construction unit

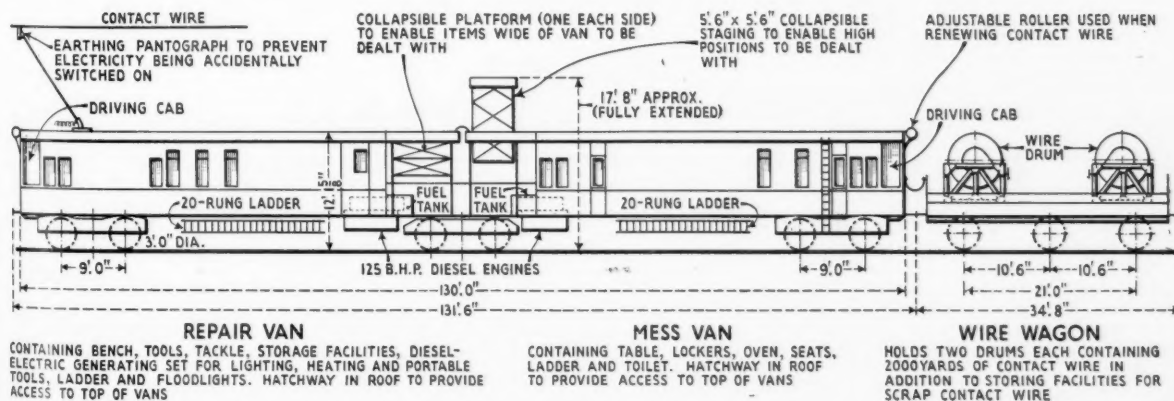


Diagram showing principal dimensions of articulated unit and wire wagon



View along roof, showing (at far end) trolley, lift, extended side platform and portable hand microphone

Drainage of the roof prevents water collecting thereon, with consequent freezing troubles in cold weather. Access to the roof is by ladders fixed to the sides of the vehicles or through two interior hatchways; the latter when closed are flush with the vehicle roof and give an uninterrupted working area. To facilitate work away from the vehicle, side flaps 6 ft. long and extending 2 ft. or 4 ft. out as required are provided on each side at the centre of the set; they can be raised

or lowered in approximately 15 sec. and are operated from floor level. A lift, manually operated from floor level and capable of dealing with a load of 10 cwt., gives an extra 6 ft. in height above roof level.

As a safety precaution, an earthing trolley is provided, which connects the contact wire to the running rails during an examination of the overhead system. Space is provided at each end of the set for the trolley, which is moved to the

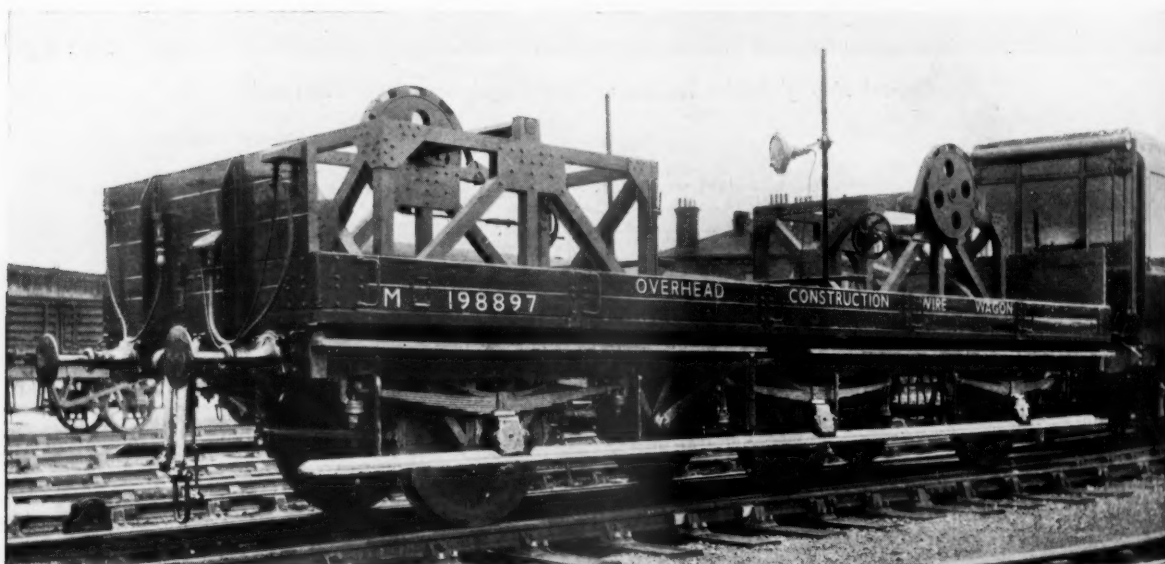
trailing position when in operation. When not required, the trolley pole is depressed to roof level and held by hooks. On the outside end face of each driving compartment is a roller mechanism for use during erection or dismantling of contact wire or catenary. The rollers are approximately 6 in. dia. and 6 ft. long, and are adjustable from roof or ballast level to a height from roof level of approximately 3 ft.

Repair Van

The repair van comprises the whole of one of the original displaced coach bodies, which was gutted and converted into a mobile workshop and stores. Here is a bench complete with cupboards and two vices, one of the normal parallel-jaw type and the other with an adjustable jaw to hold securely odd-shaped objects encountered on overhead equipment. Stores bins for normal simple fittings and shadow boards are provided for all spanners and tools used. Lockers and racks ensure orderly storage of the remaining items of equipment carried. At the driving compartment end is a 7.5-kW diesel generator supplying electricity at 230-V. single-phase a.c. The supply from this generator is used for: (1) Charging the 14-cell lead acid battery covering the engine controls, emergency lighting and windscreen de-frosters; a metal rectifier is used for this purpose; (2) normal interior lighting at 230 V.; (3) all interior heating of the unit at 230 V. through standard tubular electric heaters; and (4) supplies to 1,000 and 750 VA, 230/50 V. transformers, from which all portable tools and floodlights are operated.

Accommodation for Staff

The second coach has been converted for the domestic use of the maintenance staff and train crew. An Elsan chemical lavatory and wash basin with piped cold water are fitted, and drinking water supplied from the main water-storage tank through a standard L.M.R. filter. This section is partitioned from the mess proper. Table seating for twelve men and adequate locker space are available. Cooking facilities comprise a Calor gas cooker complete with two boiling rings



Wire wagon with portable lighting in position

and a small oven. Communication between maintenance staff and train crew is effected by a Loudaphone/Loudasound communication system, with loudspeakers and microphones in each driving compartment and in the workshop and mess sections, and also a portable microphone and speaker equipment for the wire wagon. The complete system is controlled from equipment in the repair van in conjunction with a portable hand microphone set plugged into sockets at strategic points on the roof. To enable the unit to work in the hours of darkness, 300-watt 50-V. electric floodlights are provided, fed through sockets located on the vehicle roof.

The wire wagon has been constructed from the underframe of a displaced 30-ft. coach. The new body incorporates two stands for drums of contact wire up to 2,000 yd. in length, which allow for speedy replacement of empty drums with a minimum of interference with the control mechanism. Floodlights, intercommunication and other ancillary circuits are supplied through jumper cables from the parent vehicle. The vacuum brake of the original coach is replaced by a compressed air brake including emergency-application cocks accessible by operators controlling the drums of wire.



General view of workshop section, showing roof hatchway and contact wire height and stagger gauge

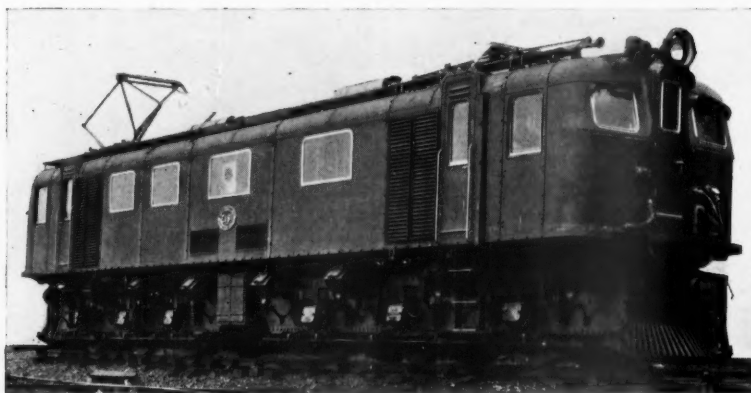
A 4,000-h.p. Electric Locomotive for Chile



Electric locomotive weighing 230 tons, largest to be exported by the General Electric Company, U.S.A., and intended for passenger and freight service on the 5 ft. 6 in. gauge, Chilean State Railways

South African Railways "3E" Class Electric Locomotives—1

A 2,700-h.p. Co + Co design, built in Great Britain, for mixed traffic on the 3,000-V. d.c. lines of the Reef electrified area



Metropolitan-Vickers 2,700-h.p. Co + Co locomotive for the South African Railways

FOR upwards of twenty years, large numbers of Metropolitan-Vickers 1,200-h.p. 4-axle multiple-unit mixed traffic locomotives have been in use on the Natal electrified 3-ft. 6-in. gauge system of the South African Railways, where heavy gradients and curved track generally restrict train speeds to a maximum of 45 m.p.h.

More recently, over the last twelve years, an extensive suburban electrified system has been built up on the Reef around Johannesburg and Pretoria, where the gradients are much less severe and the

It will be realised that this order was placed during the height of the recent war, and it was intended that the new locomotives should free many steam locomotives and some of the Natal type 4-axle electric locomotives, then used on the Reef system, for work on other lines where growing traffic and lack of current construction had resulted in a shortage of locomotive power.

Performance Requirements

The new locomotives, which are arranged for multiple-unit control by one

of 2,000 lb., whereas the locomotive weights quoted below are in long tons of 2,240 lb.]

Extremes of climate and altitude are experienced on this electrified system, snow and ice conditions occasionally prevailing in winter, whilst in summer the air temperature reaches 104° F. with 85 per cent. humidity. The average altitude of the system is 5,500 ft., with a maximum of 6,500 ft.

The following are the leading particulars of the locomotives:—

Wheel arrangement	0-6 + 6-0 (Co + Co)
Locomotive weight	110 tons
Max. permissible axle load	18½ tons
Gauge	3 ft. 6 in.
Gear case to rail, clearance	4½ in.
Motor to rail, clearance	4½ in.
Minimum track curve	270 ft. radius.
Nominal d.c. supply	3,000 V.
Number of traction motors	6
Motor groupings	6, 3, and 2 in series
Weak-field notches	3 in each motor grouping
Economical running notches	12
Drive	Axle-hung
Gearwheels	Spur, torsionally resilient
Gear ratio	23 : 71
Ventilation of motors	Forced, with filtered air
Ventilating air per motor	2,500 cu. ft. per min.
Locomotive ratings at 2,900 line volts—	
Full-field 1-hr. rating	2,700 h.p. (34,000 lb. T.E. at 29 m.p.h.)
Full-field continuous rating	2,280 h.p. (26,700 lb. T.E. at 31.5 m.p.h.)
Locomotive brakes	Compressed air
Train brakes	Vacuum
Train heating	Steam by Bastian & Allen boiler rated 320 kW., 3,000 volts, providing 860 lb. steam per hr. at 70 lb. per sq. in.

Principal dimensions of the locomotive are shown in Fig. 1, and two photographs of finished locomotives, taken in England in 1946 before shipment to South Africa, are reproduced on page 426. Fig. 2 indicates the speed/tractive effort characteristics of the locomotive in each of its twelve economical operating notches, four each in the series, series-parallel, and parallel motor combinations. The conditions represented by the lettered curves also appearing in this diagram are defined

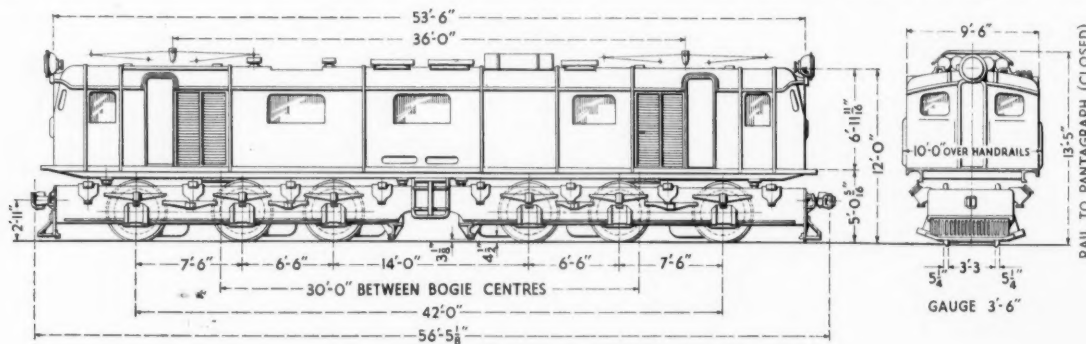


Fig. 1—Diagram showing principal dimensions of the locomotive

general lack of sharp curves, together with the excellent quality of the permanent way, permit much higher operating speeds.

The South African Railways administration has decided to eliminate steam working in this extensive area in the relatively near future, and in 1944 an order was placed with Metropolitan-Vickers by the Ministry of Supply, on behalf of the administration, for twenty-eight 2,700-h.p. 6-axle locomotives to deal with a portion of the main-line passenger and freight traffic on this system. The construction and operating characteristics of these locomotives (Class "3E"), many of which are now in service, are the subject of this series of articles.

driver, were specified to give the following performance:—

Passenger Trains.—Two locomotives coupled were to haul a 680-ton train up a 1 in 70 gradient at 45 m.p.h. and to balance on level tangent track at not less than 60 m.p.h.; the traction motors being safe for operation up to a track speed of 70 m.p.h.

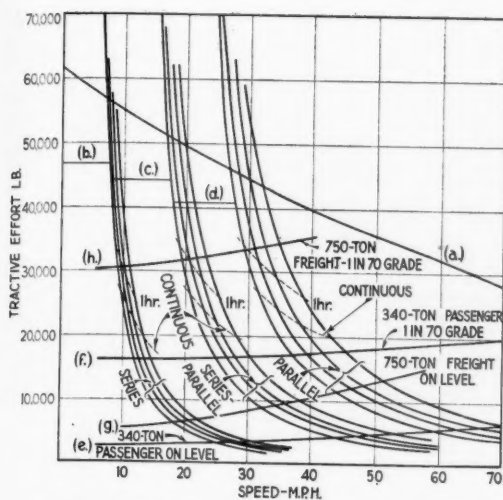
Freight Trains.—Two locomotives coupled were to be able to start a 1,500-ton train on a 1 in 70 gradient and haul it on this gradient at not less than 33 m.p.h. On level tangent track the balancing speed was to be not less than 45 m.p.h.

[All train weights are given in short tons

in the caption. These curves allow the balancing speeds of the trains on the various running notches to be seen in relation to the appropriate 1-hr. and continuous rating tractive efforts.

With reference to the permissible tractive effort curve (a, Fig. 2), it will be appreciated that higher tractive efforts can be used under dry rail conditions; and also that this limit can be exceeded even under wet conditions when the pneumatic multiple-unit sanding equipment is brought into use. The traction motors, of course, are capable of carrying any current which the available adhesion conditions allow.

When the order was placed the South African Railways desired, for standardisa-



- (a) Estimated maximum tractive efforts at the various speeds without wheel slip in wet rail conditions.
 (b) Mean tractive effort during notching within permissible current
 (c) Ditto, series-parallel.
 (d) Ditto, parallel.
 (e) Train resistance against speed for 340-ton passenger train on level tangent track (equivalent to 680-ton train and two locomotives).
 (f) Train resistance against speed for 340-ton passenger train on 1 in 70 gradient (equivalent to 680-ton train and two locomotives).
 (g) Train resistance against speed for 750-ton goods train on level tangent track (equivalent to 1,500-ton train and two locomotives).
 (h) Train resistance against speed for 750-ton goods train on 1 in 70 gradient (equivalent to 1,500-ton train and two locomotives).

Fig. 2—Locomotive performance curves at 2,900 volts

tion purposes, that as many individual components as possible should be duplicates of those on the existing 4-axle Natal type Metropolitan-Vickers locomotives, and although the axle loading was to be 18½ tons, as against 16½ tons on the former locomotives, it was found possible to use many of the existing components, such as wheels and axles, roller bearing axleboxes, road springs, articulated coupling between the two bogies, air compressor, air brake cylinders, and brake shoes, in addition to much of the 3,000-V. d.c. control switchgear. As these components have all given very good service in the past, their duplication serves the double purpose of ensuring absence of teething troubles and reducing the numbers and types to be stocked as spares.

Constructional Details

The locomotive consists of a single body and underframe, with a driving cab at each end, carried on two six-wheel bogies, articulated together. The automatic centre couplers are on the bogies, so that all draw and buffing forces are taken through the bogies and articulating joint, thus relieving the body and underframe. This system has considerable advantages where several locomotives are operated in multiple-unit, as the total tractive effort can be very considerable, and when transmitted entirely through the bogies materially eases the stress conditions in the body and underframe.

The bogies are generally of the riveted construction which has proved so successful on the earlier 4-axle locomotives, being composed of plate side frames connected transversely by three main steel castings, carrying respectively the centre drawgear, the bogie pivot, and the articulating joint. The body and underframe weight is carried on a robust

circular flat pivot centre, two side bearers and two end bearers, with wedge adjustment for clearance setting to maintain the bogie and body structures parallel horizontally under all conditions including those of the disturbing bogie structure turning moments which occur when tractive effort is being exerted by the traction motors and shoe braking is being used.

In order to ensure that equality of axle loading is maintained under conditions of normal track irregularities, the springing system on each side of the bogie incorporates two equalising beams which maintain the spring loads on all three axleboxes equal.

The axleboxes incorporate British Timken tapered roller bearings, oil lubricated, which have given remarkably successful service on the earlier locomotives. In order to minimise axle-box and horn guide wear, the axleboxes have manganese steel side and thrust faces, whilst the renewable horn guide liners are made of oil-hardened steel.

Each of the three axles of a bogie is driven through a torsionally resilient spur gearwheel by a nose-suspended, axle-hung traction motor; and the three traction motors are arranged in

the bogies in a special way to minimise transfer of weight when exerting tractive effort. This arrangement allows about 10 per cent. more tractive effort to be exerted without wheel slip than is possible with conventional three-motor power bogies.

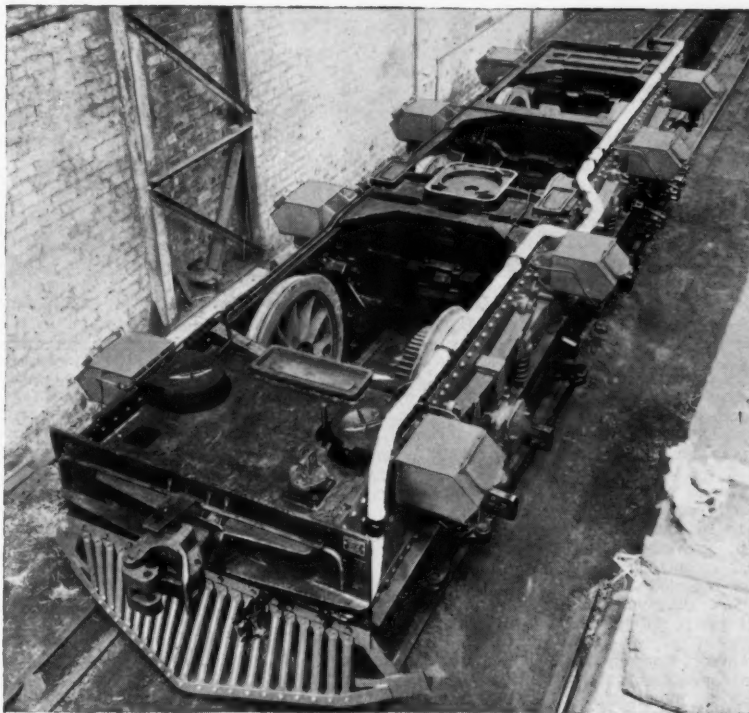
Articulated Bogies

The two three-axle bogies are coupled together by an articulating coupling permitting universal angular relative motion without restriction, but without any vertical, longitudinal or lateral relative movement—in effect, a ball joint. The underframe and body are carried on a flat pivot centre on each bogie, and as the bogie centres come together slightly when negotiating curves, the pivot housing on one of the bogies has a certain amount of free longitudinal movement to accommodate this relative movement.

The traction motors are forced-draught ventilated. As the railway passes through the gold mining areas of the Transvaal, where the air is often laden with highly abrasive dust from mine dumps, and so on, ventilating air is drawn through four sets of viscous oily filters in the side walls of the body, which remove the dust before the two motor-driven blowers discharge the air into the two systems of ducting which take it, finally via flexible ducts, to the traction motor inlets.

Auxiliary Supplies

Each blower is driven by a 3,000-V. series motor, which also carries on its shaft a 110-V. d.c. generator. The two d.c. generators supply low-tension current to the motor-driven Westinghouse brake air compressor; the motor-driven Northey Boyce twin exhaustor; locomotive heating, lighting, and control; battery charging; and also coach lighting when hauling certain types of coaches. The two motor generator sets draw their own cooling air



Driving bogie with motors removed



Driver's cab and control desk

from the filter systems and finally discharge it into the locomotive body.

Braking on the locomotive is by means of compressed air, whilst the train brake is vacuum, and the arrangement is such that an application of the train vacuum brake normally applies a proportionate

amount of air braking on the locomotive unless the driver places his air brake handle in the "release" position. It is also possible to apply the locomotive air brake by the independent air brake handle, when no proportionate train vacuum brake application occurs.

The braking system described proves very simple in practice and allows the driver several alternative ways of dealing with diverse train and gradient conditions. In addition, there is a screw-down hand brake in each driving cab, which applies the brake mechanically to its own bogie and is used when a locomotive is parked.

The driver's cab at each end of the locomotive body has a central door in the front to enable the driver's assistant to pass from one locomotive to the other when operating in multiple-unit.

All the necessary controllers, brake valves, instruments and switches are provided for full locomotive control, in addition to pneumatic window wipers, cab heaters, and other accessories. In one cab there is an electrically-heated hot-plate for food heating; the corresponding position in the other cab is taken up by a small cupboard for the driver's use.

A side corridor, running the full length of the body, connects the driver's cabs, normal access to which is by four doors in the side walls of the machinery compartments, next to the cabs. Apart from

the central doors in the front of the driver's cabs, there are no doors giving direct access to the cabs from outside the locomotive.

The body space between the cabs, apart from the side corridor, is divided into five compartments, which, starting from No. 1 end, are: machinery compartment; switch group compartment; starting and other resistance compartment; switch group compartment; and, finally, the boiler and machinery compartment.

The three central compartments, which contain the H.T. equipment, are normally locked, and access is possible only when the pantographs are down and earthed to prevent any danger of personnel coming accidentally into contact with live equipment.

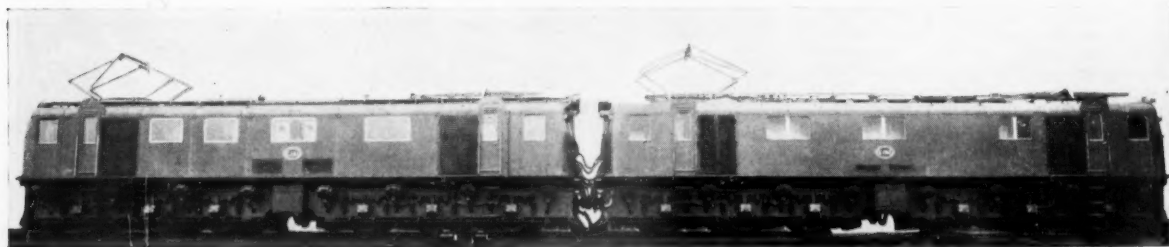
There are the following couplers at each end of the locomotive, providing for ordinary train working and multiple-unit locomotive operation:—

- Vacuum couplers for train brake
- Compressed air supply couplers
- Steam couplers for train steam heating
- 3,000-V. d.c. couplers for train electric heating (on roof)
- 110-V. d.c. couplers for train electric lighting
- 110-V. couplers for multiple-unit operation.

The new locomotives began to go into regular service towards the middle of 1947, the first few being allocated to operate on the Natal System between Durban and Volksrust, dealing with fast trains from Durban to Johannesburg. By the end of 1947 some had run mileages around the 60,000 mark, which is a good criterion of satisfactory service for a new design of locomotive.

The foregoing general description has omitted details of the electrical control equipment, traction motors, and auxiliary machines, as these subjects will be dealt with in future instalments.

(To be continued)



Two "3E" class locomotives coupled for multiple-unit operation

ROAD TRANSPORT COMPENSATION.—Members of the Road Haulage Association Long-Distance Central Panel, at a meeting on Thursday, September 22, were advised by Mr. R. Morton Mitchell, Chief Executive Officer of the Association, to accept provisional payments offered to them by the British Transport Commission, provided it was made clear that their acceptance was without prejudice. It was reported that, as a result of the R.H.A. memorandum to the Minister of Transport calling attention to delays in payment of compensation, the British Transport Commission had overhauled the procedure and was now endeavouring to speed-up payments of at least part of the compensation due. The Panel stressed that these provisional payments repre-

sented only one step in the process of compensation. Numerous points of contention remained on which discussions, and in some instances test cases, were likely to take many months.

BRITISH RAILWAYS CONTAINERS FOR PARIS EXHIBITION.—British Railways have sent six containers of the following types to the exhibition in Paris arranged by the International Container Bureau from October 6 to 16:—(a) "A" type, covered, small, a general utility container for confectionery, groceries, boots and shoes, biscuits, etc.; (b) "AF" type, highly insulated, capacity 3 tons, 193 cu. ft., for low temperature transport, with 9 in. insulation throughout; (c) "LC" type, for bulk cement, etc., capacity 2½ tons, with roof

loading, and gravity discharge through bottom doors; (d) "BC" type, capacity 70 bicycles separated by fittings; (e) "FM" type, insulated meat, capacity 4 tons, for frozen meat, fish and perishables, with 2 in. insulation; and (f) "H" type, open, small, capacity 2½ tons, for bricks, tiles and building materials, of convenient size for craning to buildings under construction. The "AF" and "BC" types were illustrated in the September 23 issue of *The Railway Gazette*.

PROFESSIONAL ENGINEERS APPOINTMENTS BUREAU.—The offices of the Bureau have been moved from 13, Victoria Street, to 9, Victoria Street, Westminster, S.W.1. The telephone number remains unaltered as Abbey 1737.

RAILWAY NEWS SECTION

PERSONAL

The Railway Executive announces that, with the approval of the British Transport Commission, Mr. E. S. Hunt, District Goods Manager, London (Broad Street), London Midland Region, has been appointed Assistant Chief Regional Officer of that Region, as from October 1, in succession to Mr. S. H. Fisher, Deputy Chief Regional Officer, who has retired.

With the approval of the British Transport Commission, the Road Passenger Executive has appointed as Secretary to the Executive Mr. E. E. King, O.B.E., who will take up his new appointment on December 19. Mr. King is at present Town Clerk of the Borough of West Ham, and has acted as Secretary of the South West Essex Traffic Advisory Committee.

Sir Richard A. Pease has been appointed a director of Heenan & Froude Limited.

Mr. R. H. Wilson has been appointed a Director of the Birmingham & Midland Motor Omnibus Co. Ltd., in place of Mr. C. H. Sutherland, who has resigned.

Mr. C. H. Sutherland and Mr. S. H. Fisher have resigned from the board of Ribble Motor Services Limited, and Mr. R. H. Wilson and Mr. E. S. Hunt have been appointed Directors.

The following notifications appeared recently in *The London Gazette*, under the heading of Territorial Army—Royal Engineers: Engineer & Railway Staff Corps:—

Major H. A. Short, C.B.E., M.C., to be Lt.-Colonel, August 31, 1949.

James Leslie Harrington to be Major, August 31, 1949.

ROAD HAULAGE EXECUTIVE

The Road Haulage Executive announces the following appointments:—

Mr. C. H. Palim (formerly a Director of P. L. & G. S. Harris Limited) has been appointed Divisional Traffic Officer, North Western Division.

Mr. A. E. Babbs (formerly Divisional Traffic Officer for the same Division) has been appointed District Manager, Stoke District, North Western Division.

MEMORIAL SERVICE FOR MR. A. G. COUSINS

The Prime Minister was represented by Mr. Anthony Bevir at the memorial service, held on September 30, for Mr. A. G. Cousins, Chairman of Transport (1910) Limited and of Odhams Press Limited, at St. Mary's Parish Church, Henley-on-Thames. Those present, in addition to family mourners, included:—

Mr. W. Surrey Dane and Mr. W. H. Parrack (Joint Managing Directors, Odhams Press Limited), with directors, editors, and managers, and other members of the staff of Odhams Press and associated companies.

We regret to record the death on September 29, at the age of 81, of Sir Herbert Ashcombe Walker, K.C.B., General Manager of the Southern Railway from 1923 to 1937, and afterwards a Director of that company. He achieved a considerable reputation among railway officers, and in the history of British railways will certainly rank as a great railwayman. The Southern Railway Company was indeed fortunate in having him as its first General

His association with what afterwards became the Southern Railway began on January 1, 1912, when he was appointed General Manager of the London & South Western Railway. At the time the rebuilding of Waterloo Station was in progress, and he was enabled to effect great economy in the reconstruction scheme as planned. This was one instance of his quickness in pointing out weak spots in, or suggesting alterations to, plans for new works schemes.

Another characteristic was his ability to grasp and handle figures. But, combined with his mastery of detail, he had both vision and courage, as exemplified by his persistent advocacy of progressive electrification on the Southern Railway, and by the great extension of Southampton Docks. Sir Herbert Walker, who had been knighted in 1915, and created a K.C.B. in 1917, was appointed a Joint General Manager of the Southern Railway, with Sir William Forbes and Sir Percy Tempest, on the amalgamation in 1923, and from January 1, 1924, became sole General Manager. He retired from the General Managership in October, 1937, and in February, 1938, was elected a Director, continuing on the board during the remaining ten years of the company's existence as such. He was Chairman of the Railway Executive Committee throughout the 1914-18 war period. Sir Herbert Walker was a strong advocate of the Channel Tunnel scheme, and was Chairman of the Channel Tunnel Co. Ltd. He was also Chairman of W. B. Dick & Co. Ltd., and a Director of other companies.

APPRECIATIONS

Sir Eustace Missenden, Chairman of the Railway Executive, and former General Manager of the Southern Railway, contributed to a recent issue of *The Times* the following appreciation of Sir Herbert Walker:—

To be a member of the team of railway officers under the leadership of Sir Herbert Walker was not only an honour and a privilege, but an outstanding education in the management and administration of a large undertaking of considerable complexity.

Many who served with him will readily recall that quiet efficiency and patient understanding which Sir Herbert Walker showed, particularly when times were difficult, and the feeling of renewed courage and endeavour with which one left his room after consultation. His two outstanding conceptions were, of course, electrification and the new docks at Southampton; speaking as one who was intimately concerned with him in these projects, one marvelled at his capacity for sustained effort until the objectives had been achieved. He was, by some, regarded as severe and shy, but those who really knew him found a loyal friend with a heart of gold. The name of Sir Herbert Walker will live as long as there are railways. Those of us who are left will not only be sad but very



The late Sir Herbert Walker
General Manager, Southern Railway, 1923-37, and afterwards a Director of the company

Manager; he succeeded in the difficult task of welding into a very efficient system the widely-different constituent undertakings which went to form the Southern Railway group. The son of a London medical practitioner, he abandoned, for family reasons, the idea of adopting his father's profession, and in 1885 entered the service of the London & North Western Railway in the office of the District Superintendent at Euston. For over fifteen years he occupied various positions on the staffs of district superintendents, including nine years as Assistant Superintendent of the Southern Division, before being appointed District Superintendent; during that period he visited the U.S.A. to study American traffic methods. In October, 1909, he was appointed Assistant to the Superintendent of the Line, and in July, 1910, became Outdoor Goods Manager of the Southern Division. When, in 1908, the North London Railway had begun to be worked as part of the L.N.W.R., he had organised the whole of the operating arrangements.

lonely without that tall figure, with its measured step and friendly look, coming again towards us.

The name of Herbert Walker will be remembered as long as railways run, and not only in England, for his reputation was of a world order. Walker was the son of a doctor, and was intended for the same profession, but for family reasons this became impossible; he was brought home from school at Bruges and set to work on the "premier line," the old London & North Western. Being both keen and industrious he soon came under notice, and his rise was, for those days, remarkably swift; and in 1912 when only 44, he was selected by the board of the London & South Western Railway to succeed Sir Charles Owens as General Manager.

He went to the old Waterloo with 27 years of traffic achievement and management experience behind him, and at once set to work to revitalise an easy-going line. He had seen, from his office at Broad Street as Superintendent of the North London Line, what electrification could do for suburban traffic, and determined to apply the lesson south of the Thames. How immensely he succeeded is railway history, and today the Southern, with the largest suburban electric system in the world, is the living image of his genius. When all suburbia was done, Walker persuaded his board to stretch out further, and so was born the "at the hour in the hour" (his own description) service to Brighton, to see which came railway executives from all over the world. Eastbourne, Hastings, Worthing, Seaford, Bognor, and finally Portsmouth were swept into the new timetables; and with every addition traffic and receipts soared.

So it was too with stations and steamers, and above all with Southampton Docks. It was Walker who created the new Waterloo, and new stations at Richmond, Surbiton, Margate, Exeter and many other places; and it was Walker who made up his mind that Southampton, not Liverpool, should be the principal English terminal for the trans-Atlantic express passenger traffic. Under his guiding hand, and supported by a courageous board in everything he proposed, vast new docks arose from what had been mud, water and waste land.

Walker was a born leader, and it was no surprise to the railway world when, on the outbreak of war in 1914, he was appointed Chairman of the new Railway Executive Committee, although one of the most junior of the General Managers of that day. His output of work was colossal, and his reward was the universal respect of all who served under him, and the unusual honour of a K.C.B. His strength as a railway manager lay in his unrivalled experience. He asked much of his officers, but nothing which he himself had not done and could not do at any time. He accepted responsibility naturally, and went about his business with monumental confidence and calm.

JOHN ELLIOT

We regret to record the death on September 29, at the age of 74, of Mr. George Ellson, C.B.E., M.Inst.C.E., M.Inst.T., who was Chief Engineer of the Southern Railway from 1927 to 1944. Mr. Ellson was born at Ripley, Derbyshire, on June 2, 1875. He was educated at Ripley College, and afterwards was apprenticed to the Butterley Co. Ltd., Derby; he served in the shops and drawing office of that firm, and studied concurrently at Nottingham University College. In 1896 he was appointed draughtsman to E. C. & J. Keay Limited, and was placed in charge of



Elliott

[& Fry

The late Mr. George Ellson
Chief Engineer, Southern Railway, 1927-44

several important contracts. Two years later he entered the service of the South Eastern & Chatham Railway in the Engineering Department, and in 1906 was appointed Resident Engineer. Between that year and 1913 Mr. Ellson was associated with several important undertakings, including the demolition of the old, and the building of a new, roof at Charing Cross Station, and the strengthening of Charing Cross and Cannon Street railway bridges. He then became Chief Assistant to the Chief Engineer; and in 1920 he was appointed Resident Engineer in charge of maintenance work throughout the whole of the South Eastern & Chatham system. On the amalgamation in 1923 he became Deputy Chief Engineer of the Southern Railway; and he was appointed Chief Engineer in 1927, the post he held until his retirement in February, 1944. Mr. Ellson was made an Officer of the Order of the British Empire, in 1920, for services rendered during the 1914-18 war; and he was promoted a Commander of the Order, for services to Civil Defence, in the New Year

Honours List, 1942. He was awarded the Telford Medal & Premium of the Institution of Civil Engineers in 1921 for a paper dealing with the strengthening of Cannon Street railway bridge; and he received Telford Premiums in 1927 for a paper on the remodelling of Charing Cross and Cannon Street Stations, in 1938 for one on the Dover train ferry dock, and in 1943 for one on the "Modern Trend of Railway Engineering Practice." He also presented two reports to the International Railway Congress: in 1929, on investigations into the static and dynamic stresses in railway bridges, and, in 1937, on the use of welding in the permanent way. Mr. Ellson was a Fellow, and a Past-President, of the Permanent Way Institution.

AN APPRECIATION

To those of us who worked under Mr. George Ellson on the Southern, during his term of office as Chief Engineer, there was never any doubt that he was first and foremost an outstanding engineer. Big works carried out under his direction will remain as testimonies to his determination, judgment and engineering ability. The rail joint which bears his name ranks as one of the most gallant attacks which has been made on the rail-joint problem under multiple-unit electric traction.

Yet possibly the greatest debt owed to him by the Southern is the condition in which he handed over the Southern tracks to his successor. Mr. Ellson was unswerving in the pursuit of a policy of improving the depth and quality of the track ballast, with the provision of good surface water drainage. Those of us who know the results of his policy, and who tackled the restoration of the Southern tracks after the war, must pay tribute to the man who started on a big scale to provide a foundation for the track suited to the increasing intensity and weight of modern traffic.

A. DEAN

We regret to record the death, at the age of 78, of Colonel Sir Philip Cahill Sheridan, who was Officiating General Manager of the East Indian Railway, 1921, and a Member of the Indian Railway Board, 1923-29.

Mr. E. C. McKinnon, who has been Chief Engineer of the Chloride Electrical Storage Co. Ltd. for 45 years, has relinquished that post, and is succeeded by Mr. C. P. Lockton, who has been his assistant and deputy for the last 25 years. Mr. McKinnon's services will continue to be available to the company in a consultative capacity.

We regret to record the death on October 4, at the age of 82, of Mr. William James Eames Binnie, Senior Partner in the firm of Binnie, Deacon & Gourley, Consulting Engineers. He was President of the Institution of Civil Engineers for 1938-39. Mr. Binnie served for a period as Resident Engineer during the building of the Central London Railway.

Mr. T. B. O. Kerr has been appointed Secretary to the General Electric Co. Ltd., in place of Mr. T. Dyke, who has retired. Mr. E. J. Cuttis has been appointed Assistant Secretary.

Mr. F. G. Bannister, Manager for Stores, Canadian Pacific Railway, Montreal, has retired, and is succeeded by Mr. Hugh P. Millar, hitherto Assistant to the Vice-President of Purchases & Stores.

Mr. John G. Bridges, Director-General of the Travel Association (Tourist Division of the British Tourist & Holidays Board), sailed on October 1 to attend the Convention of the American Society of Travel Agents at Mexico City. He will later visit Dallas, Texas; Denver, Colorado; Chicago; Toronto; and Montreal. He intends to return from New York on November 3.

PRESENTATION TO MR. O. V. BULLEID

In connection with the recent retirement of Mr. O. V. Bulleid from the position of Chief Mechanical Engineer, Southern Region, British Railways, a presentation was made to him by Mr. John Elliot, Chief Regional Officer, at a ceremony attended by Sir Eustace Missenden, Chairman of the Railway Executive, and many other railway officers. As already recorded, Mr. Bulleid has been appointed Consulting Mechanical Engineer to Coras Iompair Eireann (Irish Transport Company). In the illustration below, on the left, are shown, from left to right:—

Messrs. F. E. Campion, Assistant Civil Engineer, Southern Region; L. J. Boucher, Signal & Telecommunications Engineer, Southern Region; A. Endicott, Chief Estate & Rating Surveyor, Railway Executive; H. L. Smedley, Legal Adviser & Solicitor, Railway Executive; R. P. Biddle, Docks & Marine Manager, Southern Region; O. Cromwell, Chief Officer for Labour & Establishment, Southern Region; C. Grasemann, Public Relations & Publicity Officer, Southern Region; Sir Eustace Missenden; Messrs. W. H. Mepsted, Commercial Superintendent, Southern Region; S. B. Warder, Electrical Engineer (now Mechanical & Electrical Engineer), Southern Region; John Elliot; V. A. M. Robertson, Chief Civil Engineer, Southern Region; O. V. Bulleid; A. B. MacLeod, Stores Superintendent, Southern Region; S. W. Smart, Superintendent of Operation, Southern Region; R. G. Henbest, Estate & Rating Surveyor, Southern Region; F. J. Wymer, General Assistant to Chief Regional Officer, Southern Region; T. E. Chimes, Motive Power Superintendent, Southern Region; A. E. Hammett, Commercial Superintendent, London Midland Region.

FUNERAL OF SIR HERBERT WALKER

The funeral of Sir Herbert Walker, General Manager of the Southern Railway from 1923-37, took place on October 4 at Golders Green Crematorium. The Rev. F. L. Grant officiated. Those present, in addition to family mourners, included:—

Sir William Wood, Member of the British Transport Commission (representing the Commission); Mr. J. L. Harrington, Chief Officer (Administration), Railway Executive (representing the Railway Executive); Mr. A. Endicott, Chief Estate & Rating Surveyor, Railway Executive; Mr. John Elliot, Chief Regional Officer, Southern Region; Mr. R. P. Biddle, Docks & Marine Manager, Southern Region; Mr. G. Metcalfe (representing Mr. O. Cromwell, Chief Officer for Labour & Establishment, Southern Region); Sir John Thornycroft, former Director, Southern Railway Company; Major-General Gilbert Szlumper, former General Manager, Mr. R. G. Davidson, former Chief Accountant, Colonel C. J. Francis, former Stores Superintendent, and Mr. E. F. Livesey, former Assistant for Development to Traffic Manager, Southern Railway. Mr. G. T. Pheby, Chairman, and Mr. A. G. Evershed, Secretary-Superintendent, Southern Railway Servants' Orphanage; Sir Henry Buckland; Mr. Arthur Franks, Managing Director, and Mr. H. H. R. Drossi and Mr. A. J. Sear, Directors, of W. B. Dick & Co. Ltd.; Mr. L. M. Broadway, Director & Secretary, C. C. Wakefield & Co. Ltd.

Marshal of the R.A.F. Lord Portal has joined the board of the Ford Motor Co. Ltd.

FUNERAL OF MR. GEORGE ELLSON

The funeral of Mr. George Ellson, formerly Chief Engineer, Southern Railway, took place at Seaford Parish Church on October 3. Among those present, in addition to family mourners, were:—

Mr. A. Dean (representing Sir Eustace Missenden, Chairman, and Mr. J. C. L. Train, Member, of the Railway Executive); Mr. W. K. Wallace, late Chief Engineer, L.M. Region; Mr. A. S. Quartermaine, Chief Engineer, Western Region; Mr. F. J. Wymer (representing Mr. John Elliot, Chief Regional Officer, Southern Region); Mr. E. V. Brady (representing Mr. V. A. M. Robertson, Chief Civil Engineer, and Mr. H. Burt, Solicitor, Southern Region); Mr. V. Marsh (representing Mr. O. V. Bulleid, Chief Mechanical Engineer, Southern Region); Mr. L. J. Boucher, Signal & Telecommunications Engineer, Southern Region; Mr. R. J. Cardy (representing Mr. R. P. Biddle, Docks & Marine Manager, Southern Region); Mr. R. G. Henbest, Estate & Rating Surveyor, Southern Region; Mr. J. W. Terry (representing Mr. A. B. MacLeod, Stores Superintendent, Southern Region); Mr. F. A. Baker (representing Mr. F. R. Stockdill, Accountant, Southern Region); Messrs. C. V. Hill, H. E. Roberts, R. C. Heney, A. Cunningham, G. W. Golds, N. A. L. Cooper (representing Mr. J. H. Jellett, Docks Engi-

neer, Southern Region); Messrs. G. C. Hewison, W. J. Sawkins, Douglas Robinson (R. Robinson & Co. (Contractors) Ltd.); W. Burkett, W. Russell (representing Mr. S. W. Smart, Superintendent of Operation, Southern Region); J. G. Symes.

Mr. E. J. O'Dell, Manager of the Southampton office of Thos. Cook & Son Ltd., has retired, and is succeeded by Mr. C. F. Jefferies.

Major Robert Gascoigne, late Seaforth Highlanders, has been appointed Assistant Secretary in the Scottish Office in Glasgow of the Federation of British Industries. He will work with Mr. G. E. R. Young, Secretary of the F.B.I. in Scotland.

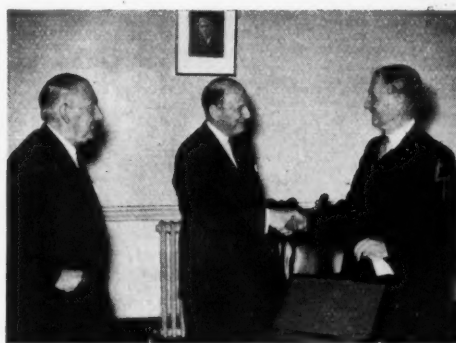
Mr. Paul W. Johnston, hitherto Executive Vice-President, has been appointed President of the Erie Railroad in succession to Mr. Robert E. Woodruff, who retires from this post, and becomes Chairman of the board.

THE LATE MR. J. A. KAY

The following appreciation of the late Mr. J. A. Kay, Editor of *The Railway Gazette*, 1910-49, has been received, further to those already published:—

Railway staff in this country were much grieved to hear of the passing away of J. A. Kay, who was for so long associated with rail transport interests, and performed his function as Editor of *The Railway Gazette* with such marked ability and distinction.—J. A. GNANAPRAGASAM, General Manager's Office, Ceylon Government Railway.

Lt.-Colonel W. Wallace has relinquished the position of Executive Engineer, Public Works Department, Lusaka, having been compelled to give up service in Northern Rhodesia because of eye trouble. He went to Northern Rhodesia eighteen months ago, and during the past six months he has been dealing with the Development Road Construction programme; he has advised the Government with regard to the seven major road contracts awarded since April. Colonel Wallace joined the Colonial Service in 1929, and worked for several years with the late Mr. Clement Gillman, then Chief Engineer, Tanganyika Government Railways, on extensive railway surveys directed by him from 1926 to 1932. He later served in the Transportation Directorate, Sudan, and during the war joined the Royal Engineers, serving as A.D. Tn, East Africa Command, and in North-West Europe. After the war he was appointed Railway Adviser to the Greek Government in the British Economic Mission.



Left: A group taken during the recent presentation to Mr. O. V. Bulleid on his retirement as Chief Mechanical Engineer, Southern Region (see paragraph above). Right: Mr. John Elliot, Chief Regional Officer (centre), making the presentation; Sir Eustace Missenden, Chairman of the Railway Executive, is standing on the left

British Transport Commission Statistics

Summary of the principal statistics for the four-week period ended August 14

During the period to August 14 the traffic receipts of British Railways decreased by 2.8 per cent. and those of London Transport by 1.5 per cent. The best result shown in No. 8 of *Transport*

Statistics* is an increase in steamship receipts of £250,000, or 19 per cent.

* British Transport Commission Statistics, 1949. Series No. 8. Period to August 14. London: British Transport Commission. Price 1s.

The Commission employed 5,233 additional persons, making a total increase of 16,606 since January 1. The Road Haulage staff increased by 26,910 during these 32 weeks, whereas British Railways dispensed with 13,917 employees.

In the month of June the number of originating passengers was nearly 7 per cent. greater, but takings were less than 3 per cent. higher, and the average receipt per journey was nearly 4 per cent. lower.

STAFF

	Commission's Head Office	British Railways	London Transport	British Road Services (Freight)	Hotels & Catering	Steamships Marine & Docks	Inland Waterways	Railway Clearing House	Common Services: Commercial Advertisement	Total
No. of employees ...	191	635,875	100,675	50,105	17,192	25,950	5,224	662	154	836,028
Inc. or dec. ...	+4	+278	-229	+323	+262	-316	+4	+1	-1	+326

1. BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS

	Four weeks		Inc. or dec.	Aggregate for thirty-two weeks		Inc. or dec.
	To August 14, 1949	To August 8, 1948		1949	1948	
	£000	£000	£000	£000	£000	£000
British Railways—						
Passengers ...	13,829	14,506	- 677	72,153	77,658	- 5,505
Parcels, etc., by passenger train ...	2,296	2,316	- 20	17,585	17,852	- 267
Merchandise ...	5,116	5,327	- 211	49,647	51,057	- 1,410
Minerals ...	1,875	1,864	+ 11	17,960	17,293	+ 667
Coal & coke ...	4,218	4,124	+ 94	41,483	39,290	+ 2,193
Livestock ...	70	62	+ 8	685	538	+ 147
	27,404	28,199	- 795	199,513	203,688	- 4,175
Steamships ...	1,548	1,298	+ 250	6,419	5,701	+ 718
London Transport—						
Railways ...	1,080	1,119	- 39	8,874	8,973	- 99
Buses & coaches ...	2,501	2,515	- 14	19,344	19,385	- 41
Trams & trolleybuses ...	830	855	- 25	6,735	6,905	- 170
	4,411	4,489	- 78	34,953	35,263	- 310
British Road Services—						
Freight charges, etc. ...	2,884	—	—	16,021	—	—
Inland Waterways ...	149	123	+ 26	1,207	1,056	+ 151
Hotels & Catering ...	1,153	1,130	+ 23	8,080	8,078	+ 2

Total freight tonnage was up, though less merchandise was put on rail. Oddly enough, total freight ton-miles were down slightly, while merchandise ton-miles rose by 0.5 per cent. The average train load fell to 144 tons, and the freight train speed of 8.86 m.p.h. was the highest since the war. The North Eastern Region registered a speed of nearly 11 m.p.h., but the general average was spoiled by a loss of movement in the London Midland Region, which worked 33 per cent. of the total freight train mileage. At 58.66 lb. per engine mile, coal consumption was the lowest for any after-war period.

The rolling stock position was not strengthened during the period, largely because 18 per cent. of the locomotives, 8 per cent. of the coaching vehicles and 11 per cent. of the wagons were under repair. The serviceable stock of wagons at the end of the period was 37,910 less than in 1948. Fewer wagons were forwarded this year and the average wagon load at starting point rose to 8 tons.

London Transport lost 2,559,000 passengers, but was able to reduce car miles appreciably on its road services. As in July, Inland Waterways recorded lighter traffic.

2. BRITISH RAILWAYS

(A) Passenger Journeys Originating in the Month of June

	Region						Total
	London Midland	Western	Southern	Eastern	North Eastern	Scottish	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Ordinary fares ...	1,012,000 (-15.74)	671,000 (-6.57)	2,151,000 (+4.45)	1,109,000 (+15.75)	150,000 (-14.37)	255,000 (-34.54)	5,348,000 (-2.79)
Monthly returns ...	4,416,000 (-12.05)	1,944,000 (+0.03)	7,379,000 (-5.17)	3,365,000 (-7.60)	499,000 (-14.92)	1,034,000 (-15.96)	18,637,000 (-7.76)
Excursion, weekend, cheap day, etc. ...	5,695,000 (+161.88)	2,589,000 (+99.74)	4,065,000 (+105.01)	2,176,000 (+176.99)	1,672,000 (+156.71)	1,738,000 (+223.03)	17,935,000 (+141.43)
Workmen ...	5,272,000 (-7.31)	1,612,000 (-17.69)	6,109,000 (-3.42)	3,235,000 (-7.05)	799,000 (-10.41)	893,000 (-10.53)	17,920,000 (-7.35)
Other descriptions ...	1,322,000 (-4.44)	921,000 (-4.32)	1,629,000 (-1.70)	792,000 (-15.02)	333,000 (-7.13)	671,000 (-7.38)	5,668,000 (-5.82)
Season tickets ...	2,895,000 (-18.68)	1,464,000 (-24.25)	9,224,000 (+2.63)	3,129,000 (-8.53)	425,000 (-19.65)	1,148,000 (-19.34)	18,285,000 (-7.90)
Total ...	20,612,000 (+8.32)	9,201,000 (+4.42)	30,557,000 (+6.12)	13,806,000 (+4.44)	3,878,000 (+21.48)	5,739,000 (+8.20)	83,793,000 (+6.95)

(B) Freight Tonnage Originating

	Region						Total
	London Midland	Western	Southern	Eastern	North Eastern	Scottish	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Merchandise ...	1,143,000 (-3.36)	681,000 (+5.37)	259,000 (-10.10)	503,000 (+11.41)	440,000 (-2.05)	460,000 (-3.01)	3,486,000 (-0.17)
Minerals ...	1,439,000 (-0.64)	592,000 (-0.65)	86,000 (-13.95)	600,000 (-1.44)	780,000 (+2.84)	554,000 (+9.18)	4,051,000 (+0.80)
Coal & coke ...	3,500,000 (+6.34)	1,572,000 (-0.23)	198,000 (-15.35)	1,610,000 (+3.05)	2,013,000 (+0.95)	1,185,000 (+1.33)	10,078,000 (+2.56)
Livestock ...	18,000 (+21.62)	11,000 (+0.93)	2,000 (-9.68)	4,000 (-18.42)	5,000 (+11.90)	27,000 (+62.50)	67,000 (-24.86)
Total ...	6,100,000 (+2.74)	2,856,000 (+0.97)	545,000 (-12.69)	2,717,000 (+3.41)	3,238,000 (+0.99)	2,226,000 (+2.69)	17,682,000 (+1.67)

(C) Net Ton Miles

	Region						Total
	London Midland	Western	Southern	Eastern	North Eastern	Scottish	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Merchandise & livestock ...	161,412,000 (-2.08)	90,362,000 (+4.45)	22,179,000 (-11.15)	66,707,000 (+4.82)	42,324,000 (+7.69)	64,389,000 (-2.36)	447,373,000 (+0.49)
Minerals ...	118,811,000 (+4.38)	61,280,000 (+0.55)	11,995,000 (-9.31)	67,200,000 (-12.70)	40,404,000 (-3.21)	35,323,000 (+10.98)	325,013,000 (-0.97)
Coal & coke ...	243,120,000 (+3.41)	103,587,000 (+0.77)	22,293,000 (-1.82)	137,139,000 (-3.35)	45,796,000 (-8.86)	51,339,000 (+1.84)	613,274,000 (-0.14)
Total all classes of traffic ...	523,343,000 (+1.87)	255,229,000 (+1.99)	56,467,000 (-7.28)	271,046,000 (-4.06)	128,524,000 (-2.59)	151,051,000 (+1.93)	1,385,660,000 (-0.14)

(D) Train Miles

	Region						Total
	London Midland	Western	Southern	Eastern	North Eastern	Scottish	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Coaching train miles—							
Steam—							
Loaded ...	4,725,000 (+3.39)	3,360,000 (+13.46)	1,773,000 (+11.14)	3,024,000 (+11.42)	1,155,000 (+5.21)	2,030,000 (+3.69)	16,067,000 (+7.86)
Empty ...	183,000 (+0.85)	180,000 (+16.53)	98,000 (+34.03)	131,000 (+14.56)	61,000 (+11.88)	88,000 (-5.66)	741,000 (+10.40)
Total, loaded & empty	4,908,000 (+3.30)	3,540,000 (+13.61)	1,871,000 (+12.15)	3,155,000 (+11.55)	1,216,000 (+5.52)	2,118,000 (+3.26)	16,808,000 (+7.97)
Electric—							
Loaded ...	457,000 (+2.52)	—	3,017,000 (+10.34)	22,000 (+7.87)	96,000 (+2.97)	—	3,592,000 (+9.05)
Empty ...	19,000 (-5.54)	—	92,000 (+22.65)	2,000 (+19.64)	9,000 (-23.24)	—	122,000 (+12.54)
Total, loaded & empty	476,000 (+2.17)	—	3,109,000 (+10.67)	24,000 (+8.83)	105,000 (+0.11)	—	3,714,000 (+9.16)
Freight train miles—							
Loaded ...	2,676,000 (-0.76)	1,541,000 (+7.11)	491,000 (-1.47)	1,494,000 (-0.51)	829,000 (+0.56)	1,237,000 (+0.75)	8,268,000 (+0.98)
Empty ...	490,000 (+5.94)	178,000 (+3.89)	17,000 (+63.08)	310,000 (+13.43)	197,000 (+6.71)	188,000 (+3.02)	1,380,000 (+7.42)
Total, loaded & empty	3,166,000 (+0.22)	1,719,000 (+6.77)	508,000 (-0.16)	1,804,000 (+1.63)	1,026,000 (+1.69)	1,425,000 (+1.04)	9,648,000 (+1.86)
Total train miles...	8,550,000 (+2.07)	5,259,000 (+11.28)	5,488,000 (+10.06)	4,983,000 (+7.73)	2,347,000 (+3.56)	3,543,000 (+2.36)	30,170,000 (+6.08)

(E) Freight Train Miles per Train Hour

		Region						Total	
		London Midland	Western	Southern	Eastern	North Eastern	Scottish		
1949	1948	1949	1948	1949	1948	1949	1948	1949	1948
7.56	7.72	9.78	9.68	8.80	8.78	8.75	8.45	10.98	10.57
								10.42	10.42
								8.86	8.82

(F) Locomotive Coal Consumption

	Region						Total
	London Midland	Western	Southern	Eastern	North Eastern	Scottish	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Tonnage consumed ...	326,000 (-0.48)	172,000 (+7.29)	81,000 (+8.70)	188,000 (+0.25)	86,000 (+2.66)	159,000 (-0.49)	1,012,000 (+1.86)
Lb. per engine mile ...	60.32 (-2.55)	50.37 (-1.33)	53.73 (+1.63)	60.10 (-3.30)	59.60 (+0.30)	67.55 (-1.53)	58.66 (-2.00)

(G) Rolling Stock Position

	Operating stock	Number under repair	Serviceable stock	Serviceable stock in 1948
Locomotives ...	19,992	3,638	15,906	16,158
Coaching vehicles ...	55,870	4,928	50,942	49,403
Freight wagons ...	1,140,712	139,186	1,001,526	1,039,436

3. INLAND WATERWAYS

Tonnage of traffic and ton miles

	Tonnage	Per cent.	Ton miles	Per cent.
General merchandise ...	304,000	(+3.87)	5,030,000	(-9.36)
Liquids in bulk ...	113,000	(-8.87)	2,909,000	(-0.44)
Coal, coke, patent fuel & peat	342,000	(-4.82)	5,124,000	(-1.11)
Total ...	759,000	(-2.19)	13,063,000	(-4.32)

4. LONDON TRANSPORT

(A) Passenger Journeys Originating

	Number	Per cent.
Railways ...	46,194,000	(-2.28)
Buses & coaches ...	212,144,000	(+0.39)
Trams & trolleybuses ...	88,604,000	(-2.53)
Total ...	346,942,000	(-0.73)

(B) Rail and Road Car Miles

	Miles	Per cent.
Railways ...	17,773,000	(+0.90)
Buses & Coaches ...	24,153,000	(-0.81)
Trams & trolleybuses ...	8,592,000	(-1.71)
Total ...	50,518,000	(-0.37)

Staff & Labour Matters

Railway Wage Claim

The N.U.R. special delegate conference of September 29 and 30 decided by a three to one majority to accept the findings of the Conciliation Board as to the rates of pay and conditions of service of salaried and conciliation staff. It was resolved that, as the N.U.R. had agreed to accept the terms of reference of the Board of Conciliation, it had no alternative but to accept the recommendations of the Board, as follow:—

(1) Neither the claim for a flat rate, or any increase, nor the claim for enhanced payment for time worked after noon on Saturday is justified at the present time.

(2) Abolition of rural rates.

(3) Arrangements for men reduced in grade owing to eyesight failure, ill-health, or accident.

(4) Payment for work performed on rest days.

(5) Credit and payment to passed firemen and passed cleaners for higher grade turns when drivers and firemen are required to work on their rest days.

(6) Bank and public holiday arrangements for salaried and conciliation staff.

(7) "Turn" system for locomotive men.

(8) 42-hr. week for station masters, agents and supervisory staff who are called upon to supervise staff whose working hours are fixed at 42 per week.

(9) Increased "on-call" allowances for salaried staff required to be on call on alternate week-days or weeks and/or alternate Sundays.

(10) Revision of the scale of marks in the classification of certain boxes.

The conference instructed the N.U.R. Executive Committee to reopen negotiations with the Railway Executive and the other Executives of the British Transport Commission "with a view to an improvement in the wages being obtained by low-paid employees." The resolution also stated that "We consider that no employee should be in receipt of less than a £5 standard weekly wage, exclusive of the London allowance." This was carried by 63 votes to 16. A further resolution that the findings of the Board should be formally accepted, but that the N.U.R. should protest against them by calling on its members to work to rule and to ban overtime and Sunday duty, was defeated by 62 votes to 17.

In the course of the earlier negotiations with the three railway trade unions, the Railway Executive, in an attempt to meet the N.U.R. as regards the claim for 10s. a week, offered to increase the rate of the lowest paid worker from 92s. 6d. to 95s. 6d. a week. There was a gradual tapering upwards, so that the man on 98s. a week would have received an increase of 6d. a week. This offer was rejected by the N.U.R. as being too meagre in face of the application for a flat rate increase of 10s. a week for all workers. The A.S.L.E. & F. and the Confederation of Shipbuilding & Engineering Unions stated that the proposed increases would destroy the existing ratio between grade and grade, a matter on which agreement had been reached after protracted negotiations following the recommendations of the Court of Inquiry in June, 1947. The Court then had expressed the view that there was an urgent need for detailed and exhaustive consideration of the grading of the various classes, scales, and categories of railway employees, with a view to a more accurate

assessment of the relative values of the different types of work performed; and that consideration should be given to the re-arrangement of inter-grade margins to give adequate incentive to accept higher responsibility consequent on promotion, due account being taken of the mobility of labour which is a feature of railway operation and of the difficulties and expense occasioned in any occupation involving transfer from place to place. In accordance with this recommendation, the trade unions reached agreement on February 28, 1948, as a result of which the rates for a large number of grades were increased to bring the grade differentials into a proper relationship. These increases varied from 6d. to 8s. 6d. a week, but no increase was granted to grades in receipt of the minimum rate of 92s. 6d. a week.

The N.U.R. claimed before the Board of Conciliation that 11 per cent. of the conciliation grades are in receipt of a minimum rate of 92s. 6d. a week, and that 55 per cent. of the conciliation grades are in receipt of less than 100s. a week. The Board, however, draw attention to the fact that of the 55 per cent. referred to, a very large number are in receipt of grade rates with minima varying according to grade from 95s. 6d. to 99s. 6d. a week, with the opportunity of promotion to higher grades. Whereas the average weekly basic rate for the grade 2 porter was 92s. 10d., the average weekly earnings of that grade were 112s. 7d., an increase of 21 per cent. over the average wage.

Mr. Figgins, General Secretary of the N.U.R., stated at the conclusion of the special delegate conference that the wage claim for the lower paid workers would not be contrary to the wages policy announced by Sir Stafford Cripps in the devaluation debate in the House of Commons on September 27. A circular was sent out to all N.U.R. branches on September 29 calling on members to accept the decision of the special delegate conference and to continue normal working. It is expected that the new wages claim will be lodged shortly with the various Executives. This will be the third wage claim lodged by the N.U.R. since August, 1948. The first claim, for a flat rate increase of 12s. 6d. a week for all railway workers, was submitted to the Railway Executive on August 30, 1948. After the rejection of that claim, the N.U.R., on May 2, 1949, lodged a new claim for a flat rate increase of 10s. a week and for enhanced payment for all time worked after 12 noon on Saturdays.

A conference of the unions affiliated to the Confederation of Shipbuilding & Engineering Unions is to be held at York on October 12 to discuss the wage policy to be adopted by the Confederation in the Railway Shopmen's National Council. The Board of Conciliation recommended that the N.U.R. claim on behalf of railway shopmen and also that for enhanced payment for Saturday afternoon work should be referred back to the Railway Shopmen's National Council, to be dealt with under its constitutional procedure. The parties concerned are not bound to accept the Board's recommendation, and so far no request has been received by the Railway Executive from the N.U.R. and the Confederation of Shipbuilding & Engineering Unions that the item be listed for discussion at an early meeting of the Railway Shopmen's National Council. The situation is complicated because the Confederation of Shipbuilding & Engineering Unions has announced that its

general council has been instructed to press for a general increase of £1 a week in the pay of its constituents. A number of railway shopmen are members of the constituent unions of the Confederation, and these men are working alongside other shopmen who are members of the N.U.R.

The N.U.R. Executive met in London on October 4 and 5 to consider the decisions of the special delegate conference of September 29 and 30 regarding the claim for the lower-paid railwaymen.

On October 4 and 5 a meeting also took place between representatives of the Railway Executive, the N.U.R., the A.S.L.E. & F., and R.C.A. to discuss details of the implementation of the recommendations of the Board of Conciliation.

Future of Belfast & County Down Railway

The Northern Ireland Transport Tribunal on September 26 began its inquiry into the application by the Ulster Transport Authority for the closing down of the following lines of the former Belfast & County Down Railway: Ballynahinch and Ballynahinch Junction, Downpatrick and Ardglass, Comber and Newcastle, Belfast and Donaghadee. The Tribunal is composed of Sir Anthony Babington, K.C. (Chairman), Mr. R. G. Manson, C.I.E., and Mr. M. P. Sinclair, F.C.A.

Mr. C. A. Nicholson, K.C., who outlined the case for the Transport Authority, said the step was inevitable, and would have been taken long ago had the necessary powers existed; if not taken, it was bound in the end to lead to the financial collapse of the Authority and possibly to the collapse of public transport in Ulster. In the year ended September 30, 1948, the loss on the B.C.D.R. had been £127,000, in spite of a profit of some £1,000 made on the Bangor line, which meant that the total deficit on that portion of the railway it was proposed to discontinue was more like £138,000. For the eleven months ended August 31, 1949, the total loss had been £183,695, and, unfortunately, the Bangor section also showed a deficit for that period. In the eleven months ended August 31 the Ulster Transport Authority had a deficit overall of £114,000.

There was now an extremely critical situation, but the U.T.A. believed it could cope with it provided its hands were free to take proper measures. It believed that temporary expedients and long-term experiments were no good in such a situation, which required drastic action.

A proposition was being put forward on behalf of the Down County Council for the introduction of the latest designs in diesel cars, which might take two or three years to procure; but in his opinion that was impracticable and visionary. The problem must be solved in a much shorter time than two years.

It could not be regarded as a purely local matter. It was one in which the whole question of transport and the whole interest of the travelling public and the taxpayer in Northern Ireland must be considered. He contended that in making the application the U.T.A. was doing no more than the Transport Act of 1948 demanded. The very idea of a single authority was to provide the means whereby wasteful services could be cut out.

Had there been any objection to the closing of the railway lines on strategic grounds the Tribunal would have been informed from official sources.

Mr. A. Morrison, Chief Officer (Special Duties), was the first witness for the Authority. He said that in County Down there had been, after the war, a great demand for new road services and improved services. Those requests had to a large extent been met. About seven times as many people travelled by road as by rail. The Authority was convinced that no increase in revenue would result from an increase of fares. There was no truth in the idea that the Authority was trying to "kill" railway traffic; on the contrary, it was doing everything possible to get passengers to travel by rail.

Mr. Morrison said that the discontinuance of services on the old County Down Railway except those between Belfast and Bangor would mean a saving of approximately £150,000 annually to the Authority. None of the suggestions made to the Authority for maintaining the railway offered any solution. Undoubtedly, considerable economy would be effected by the operation of diesel railcars; but a drawback was that such vehicles would not be able to cope with morning and evening peak traffic, and the Authority would still have to keep steam engines and coaches to deal with that traffic. The Authority had considered the possibility of eliminating freight traffic on the railway so as to secure the more extensive use of diesel railcars. That would have entailed the provision of an alternative freight service by road. The net saving would be only some £4,500.

Dealing with a suggestion that the discontinuance of railway services would interfere with excursion traffic to Newcastle and Donaghadee, Mr. Morrison submitted that the existing summer traffic could be dealt with by road services without difficulty. He admitted that there might be some inconvenience to day-trippers travelling with children because of the difficulty in carrying prams; but it was proposed to run a lorry with specific buses as an experiment. The public service vehicles regulations did not permit trailers with buses, but if the regulations were amended they would experiment with the trailer.

The hearing was adjourned.

International Committee of Railway Transport

Delegates of railway administrations from fourteen countries attended at a meeting of the International Committee of Railway Transport (Comité International des Transports par Chemin de Fer), which took place at St. Gall, Switzerland, early in September. Mr. P. Kradolfer, a general manager of the Swiss Federal Railways, presided. At the meeting various new provisions concerning the international railway transport were adopted, notably the uniform rules and regulations which are to govern the international conveyance of express parcels and which are to become operative on January 1, 1950. The committee includes nearly all the railway administrations which have adopted the Berne Convention for the international conveyance of passengers, luggage and goods by railway.

ROAD HAULAGE EXECUTIVE.—The District Manager's Office of the North-East District, South-Eastern Division, Road Haulage Executive, has been moved from 29, Duke Street, London, W.1, to 38-42, Pear Tree Street, London, E.C.1.

International Timetable & Through Carriage Conference at Brighton

Details of services required for heavy Anglo-Continental traffic expected in 1950 will be worked out at the conference

As announced in *The Railway Gazette* of September 23, the International Timetable & Through Carriage Conference is meeting this year at Brighton, and it assembled in the Royal Pavilion on October 5. The only notable exceptions to the European countries represented are Spain and Portugal; Russia, the Eastern and South-Eastern European and several Asiatic countries have sent delegates. The conference was opened by Sir Eustace Missenden, Chairman of the Railway Executive.

In his address Sir Eustace Missenden said that it was his privilege, as Chairman of British Railways, to welcome the delegates to this country. It was 18 years since this conference was held in Britain, and during some of this period the work of the conference was interrupted by the misfortune of a second world war.

They met before in the Hotel Great Central in London; today that building served as headquarters of British Railways. On this occasion their activities would be directed to the further improvement of services, to take advantage of the remarkable progress made in the restoration of lines and bridges following the chaos of war. As Operating Officers, he was sure that they would wish to acknowledge with him the great credit due to the railway engineers responsible for the reparation works.

During the summer, traffic on many of the routes between Britain and the Continent had equalled the carryings before the war, despite the serious shortage of shipping. During the war, 20 cross-Channel passenger vessels of British Railways were lost, but since 1945 11 new ships had been brought into commission and three more were under construction.

He was very pleased that Brighton should have been chosen as the meeting place for the 1949 Conference, and hoped they would enjoy their stay in that resort. Due to war efforts, they could not perhaps provide the delegates with all of those small luxuries which made life so pleasant in some of their countries, but a full programme of functions and excursions had been arranged for their pleasure when business was adjourned. He trusted they would make the most of them and leave these shores with happy recollections of their visit.

In conclusion, he said that they had to proceed with their important task of co-ordinating the international timetables and through carriage working, and he wished them success in their deliberations.

Monsieur E. Ballinari, Chief of the Operating Department, Swiss Federal Railways, replied to Sir Eustace Missenden's opening speech. He took the opportunity of wishing the Chairman and delegates a warm welcome and also to express to Sir Eustace Missenden their sincere thanks for his kind words. It was in 1931 that the last European Passenger Timetable Conference was held in England, in London. It was therefore a great pleasure for them to be once again, after 18 years, in this beautiful and hospitable country.

They particularly thanked British Railways for the splendid preparations for the Conference and for the charming reception of the delegates and their ladies. They especially appreciated the facilities accorded to them for enter-

ing this country, facilities with which the Conference was most concerned, to accelerate the running of international services.

They were about to begin their meetings, first of all dealing with the Simplon Orient Express, as shown on the agenda, and they trusted that their work would be performed, as in the past, in a spirit of perfect collaboration and that they would show results of increasing value to the operation of the European railways.

During its 10-day session, the conference arranges for expresses to meet the expected demands, to improve services and to co-ordinate connections to and in all parts of Europe and the Near and Middle East. Electrification progress in France will mean increased speed of some services, with consequent repercussions on international connections and necessitating re-casting of timings. Next year there will be a great flow of traffic to Italy for Holy Year, and this is bound to affect Switzerland, through which several main routes to Italy pass. In view of its geographical situation, Switzerland is particularly affected by the work of the conference, for which it provides the secretariat.

In our editorial on page 405 we listed the six international trains which the conference regards as the most important in Europe and which form the basis on which the timetables of all other main expresses in Europe are settled. They are the six trains which affect the greatest number of countries and do not, therefore, include such famous trains as the Rome Express or Sud Express, which traverse only two or three countries.

The increasing preference of British tourists for the Basque Coast and the Pyrenees is reflected in a proposal to be debated at the conference for a through coach from Calais to Hendaye. It is also proposed to alter the departure time of the London connection of the Simplon-Orient Express from the afternoon to the morning to give better connections at Milan and Trieste. This would have important repercussions all the way from Calais to Istanbul and even on the onward connections to Baghdad, Basra, Cairo and Teheran.

The newest of the six *grands trains internationaux* is the Balt-Orient Express from Stockholm and Oslo to Istanbul, via the Trelleborg-Odra (formerly Swinemünde) train ferry, Warsaw, Wrocław (formerly Breslau), Prague, Budapest, Bucharest and Belgrade, as mentioned in our issue of April 8, 1949. This express was conceived at the Istanbul Conference in 1947 and made its appearance in the 1948 summer timetables. It is unlikely, however, that the conference this year will see the emergence of another new European express.

The conference does not expect that devaluation of the pound will much affect travel from this country to the Continent next year, and additional cross-Channel services are being put on.

B.T.C. POLICE FIRST AID COMPETITION.—The finals of the first national first aid competition for the police of the British Transport Commission, under the auspices of the St. John Ambulance Association, will be held in the shareholders' room at Euston Station, N.W.1, on October 11, commencing at 1.30 p.m.

Notes and News

Assistant Engineers Required.—Assistant engineers, civil, are required for the London office of the Crown Agents for the Colonies. Candidates should not be over 40 years of age. See Official Notices on page 435.

Draughtsman, Grade II, Required.—A draughtsman, grade II, is required by the East African Railways & Harbours Administration, for one tour of 40 to 48 months in the first instance. See Official Notices on page 435.

Railway Engineer Required.—A firm of precision engineers requires the services of a railway engineer with at least 20 years experience in railway locomotive and rolling stock design, and/or operation at home or abroad. See Official Notices on page 435.

Vacancies on East African Railways.—Clerks, Grade II, not over 30 years of age, are required by the East African Railways & Harbours for the transportation department for one tour of 40-48 months with prospects of permanency. See Official Notices on page 435.

Traffic Inspector, Grade II, Required.—A traffic inspector, grade II, not over 35 years of age, is required by the East African Railways & Harbours Administration for the transportation department, for one tour of 40 to 48 months with prospects of permanency. See Official Notices on page 435.

Railway Students' Association.—Mr. John Benstead, Deputy Chairman of the British Transport Commission, will deliver his Presidential Address to the Railway Students' Association on Wednesday, October 19. The meeting will be held at the London School of Economics, Houghton Street, London, W.C.2, at 6.30 p.m., preceded by the President's reception at 5.45 p.m.

L.M.R. Posters.—The London Midland Region of British Railways has issued two interesting and attractive posters. One of these is "Trafalgar Square," which has been designed by Claude Buckle for the Region's forthcoming winter display. The other is "The Lake District," a pictorial poster by Cawthorne, the design of which was issued with an L.M.S.R. footnote before the war.

Realignment at Euston Station, London.—Working in two shifts during the six weekends commencing October 1, between midnight Saturday and 6 p.m. Sunday, 150 London Midland Region staff are to relay and realign the arrival lines into Euston Station. The operation will make it necessary for certain main-line trains normally running into Euston to be diverted to St. Pancras; other trains will terminate at Willesden Junction and passengers will be taken forward by electric-train services.

Renewal of Crossings at Newcastle.—The crossings between the high level bridge lines and the main lines to the North at Newcastle, British Railways, North Eastern Region, one of the largest and most concentrated layouts of diamond crossings in the world, involving 92 crossings and rails covering 77 intersections, are being renewed in manganese steel during the Sundays, October 2, 9, 16 and 23. Because of this work, very extensive passenger train alterations have been necessitated and on the first three Sundays no trains are arriving or leaving

Newcastle via high level bridge, and the Newcastle-South Shields electric train service is being substituted by steam trains and diverted via King Edward Bridge, missing Gateshead East Station. A bus service between Gateshead and Felling is being arranged in connection with the diverted trains. On Sunday, October 9, the North Tyneside electric train service will be affected, and these trains will be diverted via the Riverside branch.

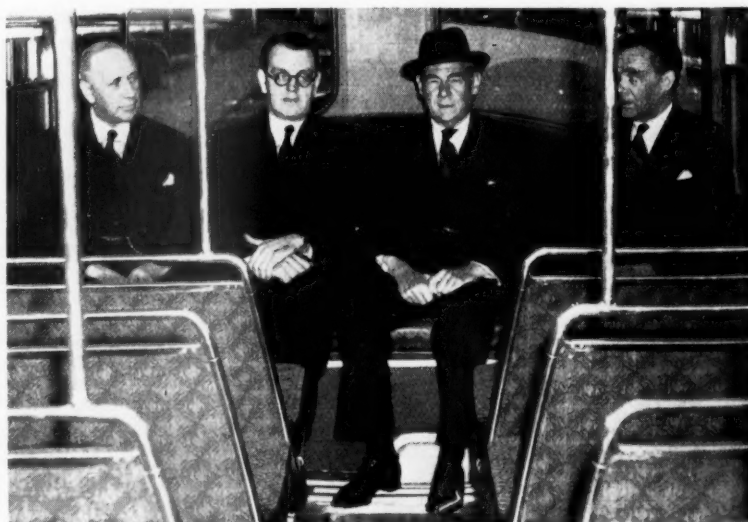
Southern Region Lecture & Debating Society.—The September programme of visits to places of transport interest, for members of British Railways, Southern Region, Lecture & Debating Society, opened on Saturday, September 17, with a visit under the leadership of Mr. K. W. B. Davies, Honorary Assistant Secretary of the Society, to Folkestone Warren and harbour. At Folkestone Warren, members were shown the sea defence works, and the borings to ascertain the sources of the water causing earth slips in the Warren. At the harbour the party was met by Mr. G. A. Pugsley, Traffic Assistant (Folkestone Harbour), and inspection was made of the Customs and quay arrangements and of the Southern Region vessel T.S.S. *Maid of Orleans*.

Inspection of New Double-Deck Bus.—On September 30, Sir Cyril Hurcomb, Chairman, British Transport Commission, accompanied by Lord Rusholme and Sir William Wood, Members of the British Transport Commission, inspected the prototype of a new low-bridge double-deck bus, at Victoria Garage, London Transport. During recent months the Bristol Tramways & Carriage Co. Ltd., in collaboration with Eastern Coach Works Limited, companies which are controlled by the Commission, had been working on a design for a bus which has a laden height of approximately 13 ft. 2 in., without having the familiar low-bridge side gangway and four-abreast seating on the upper deck. The new vehicle accommodates 58 passengers, as compared with the normal capacity of 55 for a low-bridge bus, and both the upper and lower deck seating is arranged with a central gangway providing the regulation head room. To

achieve this result, and to obtain a lower deck gangway which is about 12 in. lower than normal and is on the same level as the entrance platform, a very considerable re-arrangement has been necessary in the layout of the chassis frame and transmission units. Though this has necessarily introduced some complications in design, the normal weight for this class of vehicle has not been exceeded. The new vehicle is of pleasing appearance and ease of loading has been improved by the absence of the usual lower saloon entrance step and by the easy staircase.

Irish Transport Strike Ends.—The six-week-old strike of 400 workers in the road-freight section of Coras Iompair Eireann has now ended. The stoppage had been caused by the suspension of a lorry driver and his assistant for alleged refusals to obey orders. Under the terms of settlement, the Irish Transport & General Workers' Union recognises the right of the company summarily to dismiss or suspend an employee guilty of exceptionally grave misconduct. It is also agreed that the men concerned in the origin of the stoppage will both pay a fine of 10s. for their breach of regulations at the Broadstone Depot on August 13. A strike of railwaymen at North Wall, Dublin, was called off when the road-freight workers' strike ended.

Prize Scheme for Best-Kept Lengths of Track.—The Railway Executive has introduced a system of awards for the best-maintained lengths of permanent way. Prizes are to be given annually to the gang in each district whose length is adjudged, by a uniform system of marking, to be the best maintained length in the whole district. Further prizes will be awarded to gangs who have achieved the most satisfactory results when factors over which they have no control are taken into consideration as well as the marking. This uniform system of marking is applied to the whole of the track of British Railways and affords a valuable means of assessing the condition of the permanent way throughout the system. It is carried out by the District Engineers or other qualified representatives trained for the



Mr. G. Cardwell, Chairman, Road Passenger Executive; Mr. A. J. Romer, Director, Bristol Tramways & Carriage Co., Ltd.; Sir Cyril Hurcomb, Chairman, British Transport Commission; and Mr. S. Kennedy, Member, Road Passenger Executive, inspecting a new-type double-deck bus

OFFICIAL NOTICES

Crown Agents for the Colonies

None of the vacancies on this page relates to a man between the ages of 18 and 50, inclusive, or a woman between the ages of 18 and 40, inclusive, unless, he, or she, is excepted from the provisions of the Control of Employment Order, 1947, or the vacancy is for employment excepted from the provisions of that Order.

Crown Agents for the Colonies

CLERKS, GRADE II, required by the East African Railways and Harbours Administration for the Transportation Department, for one tour of 40-48 months with prospects of permanency. Salary according to age, qualifications and experience in the scale £462 by £18 to £570 a year. Free quarters and passages and liberal leave on full salary. Superannuation fund. Outfit allowance £30. Candidates not over 30 years must have received a good general education up to Matriculation or School Certificate standard, and should have a good working knowledge of one or more branches of railway traffic working. A knowledge of both commercial and operating work would be an advantage and candidates who have qualified by examination in one or more railway subjects will be preferred. There is a good prospect of promotion with the possibility of eventual senior appointment in the Administration for those who show themselves suitable. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/24657/3E on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

PRECISION engineers require services of Railway Engineer with at least 20 years' experience in railway locomotive and rolling stock design, and/or operation, at home or abroad. Position offered as Head of Railway Sales Engineering Division. Salary £1,500 per annum to man with desired experience and background.—Apply Box 483, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

purpose. It is expected that this scheme will be a valuable contribution towards a higher standard of track maintenance, by reason of the stimulus to greater interest in their work among all concerned in maintenance duties. The permanent way inspector of each district getting the highest average marking per length is to be awarded a cup to be held for twelve months, and a miniature cup for his retention.

Institution of Mechanical Engineers.—The annual dinner of the Institution of Mechanical Engineers will be held on October 20, at the Dorchester Hotel, Park Lane, London, W.1, at 7 for 7.30 p.m.

Collision near Sharnbrook.—When the engine of a goods train fell from Oakley Viaduct, near Sharnbrook, London Midland Region, on October 4, the driver and fireman were killed and a 30-yd. section of the viaduct parapet was smashed. The engine had been in collision with a stationary goods train.

Closing of Eastern Region Station.—The Eastern Region of British Railways announces that as from November 7, 1949, Barnby Moor Station will be closed. Parcels traffic at present handled there will be dealt with at Retford Station, from which point railway collection and delivery services will operate in the Barnby Moor district.

Unusual Job for British Railways Containers.—The British Railways, Eastern Region, container service recently was put to a new use, when in conjunction with the British Iron & Steel Research Association a collection was made of iron and steel samples placed in the ground five years ago, to test the effect of prolonged burial. A covered "B" type container collected samples buried at Pitsea and elsewhere near Southend, and conveyed them to Stanton Ironworks in Derbyshire.

TRAFFIC INSPECTOR, GRADE II, required by the East African Railways and Harbours Administration for the Transportation Department for one tour of 40 to 48 months with prospects of permanency. Commencing salary according to age, qualifications and experience in the scale £590 rising to £690 a year. Free quarters and passages. Superannuation fund. Liberal leave on full salary. Candidates, preferably not over 35 years of age, must have received a good general education up to Matriculation or School Certificate standard and should have had a thorough all-round experience in all branches of railway operating and traffic working, including the commercial aspect. Preference will be given to candidates who have had some experience of road services, as the selected candidate will be concerned particularly with the operation of road vehicles. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/22637/3E on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

Crown Agents for the Colonies

DRAUGHTSMAN, GRADE II, required by the East African Railways and Harbours Administration for one tour of 40-48 months in the first instance. Commencing salary according to age, in the scale £462, rising to £570 a year. Outfit allowance £30. Free passages and quarters. Candidates between 22 and 25, must have served an appropriate apprenticeship with British Railways or an engineering firm of repute and have had subsequent experience as a draughtsman in the detailing of mechanical designs, preferably including locomotive, carriage and wagon and machine details. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/24790 (3B) on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

Crown Agents for the Colonies

ASSISTANT ENGINEERS—CIVIL required for the London Office. Salary scale £475 by £25 to £750 a year. The £475 minimum is linked to entry age at 25 with the addition of £25 for each year above that age up to £600 and subtraction of £25 for each year below 25. Extra duty allowance of 8 per cent. of annual salary also payable at present. Engagement will be on unestablished terms with a prospect after satisfactory service of appointment to the established and pensionable staff in due course, vacancies permitting. Before assuming duties with the Crown Agents the persons engaged will be required to undertake a period of service (not exceeding four years) in one of the colonies for which a higher rate of salary and an outfit allowance are payable. Candidates, not over 40 years, should be Chartered Civil Engineers or be exempt from Parts A and B of the examination of the Institution of Civil Engineers, and have had at least two years' practical experience of civil engineering works, including either (a) experience in design, construction and maintenance of roads and bridges, buildings and waterworks, or (b) general experience on railway maintenance, including permanent way, bridge work and reinforced concrete construction. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience and mentioning this paper to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/24916/3D for post (a) and M/N/24637/3D for post (b) on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

THE RAILWAY HANDBOOK provides the railway student with a collection of useful statistics and information relating to the railways of Great Britain and Ireland. In addition, in matters of international interest, such as speed and electrification progress, the book extends its scope to cover the whole world in order to present a complete picture of these increasingly-important developments. 120 pp. Dy. 8vo. Paper covers. Price 5s. By post 5s. 3d. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

An appreciation of the arrangements made has been expressed by the British Iron & Steel Research Association. Reference to the varied applications of British Railways containers was made in *The Railway Gazette* July 9 and September 23 issues.

Insulite Double-Glazing Units.—After a number of installations in various locations, Insulite double-glazing units, which are produced by Pilkington Brothers Limited, have now been made generally available. When the Pullman observation cars for the Southern Railway "Devon Belle" went into service in 1947, double-

glazing was used to avoid condensation and to assist in sound-proofing the cars. The Insulite units are hermetically-sealed window units composed of two panes of glass, separated by a metal spacer and a $\frac{1}{4}$ in. cell of dehydrated air. As still air is a bad conductor of heat, and unless it moves freely, will not pass heat through itself quickly, the units will provide thermal insulation and reduce heat losses. Condensation is restricted and it is claimed that cold down draughts will be eliminated. Polished plate, sheet, or most patterned glasses are used, and Armour-plate glass may be used subject to certain limitations

Double-Deck Suburban Electric Unit



Southern Region 4-car double-deck electric set on a trial run between Brighton and Haywards Heath, passing Wivelsfield Station

Photo]

[B. J. Holden

of size, according to its thickness. The much larger air space between panes—from 4 to 10 in.—which is necessary for good insulation was impracticable in this case, though a certain amount of noise is eliminated. The hermetic seal is provided to prevent the entry of dirt or moisture between the glasses. Treble or quadruplicate glazing units are also manufactured for use where a higher degree of insulation is necessary. Although the units are exported, common sizes may be obtained in this country in four to five weeks and special sizes in six to eight weeks.

Forthcoming Meetings

- October 7 (Fri.).—Scottish Society of Students of the Locomotive, at 302, Buchanan Street, Glasgow, C.2, at 7.30 p.m. "Maintenance Problems Associated with L.M.S.R. Standard Designs," by Mr. R. F. Harvey, Motive Power Superintendent, Scottish Region.
- October 8 (Sat.).—Permanent Way Institution, Manchester & Liverpool Section. Ten minute lectures by members of the section.
- October 8 (Sat.).—British Railways, Southern Region, Lecture & Debating Society. Visit to Southampton Docks.
- October 10 (Mon.).—British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas Street, London Bridge. "The Economics of Travel," by Mr. L. Lickerish, and "The Travel Association," by Mr. Kershaw.
- October 11 (Tue.).—Institute of Transport, Metropolitan Section, Guildford & District Group, at the "Railway Hotel," Guildford, at 7 p.m. Discussion: "Is the useful life of railways done? If so, what should replace them?" Initiated by Sir Godfrey Armstrong.
- October 11 (Tue.).—Institute of Traffic Administration, Manchester Centre, at the "Grand Hotel," Manchester, at 7.15 p.m. "The Mechanical Horse," by Mr. A. H. Thomas.
- October 12 (Wed.).—Institution of Locomotive Engineers and Institution of Railway Signal Engineers, joint meeting at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m. "The Relationship of Signalling and Brake Power in the Handling of Modern Traffic," by Mr. O. S. Nock.
- October 14 (Fri.).—Institution of Railway Signal Engineers, in the London Transport Signal School, Earls Court Station, S.W.5, at 6.15 p.m. "Layout of Signals," by Mr. W. H. Challis.
- October 14 (Fri.).—Railway Club, 57, Fetter Lane, London, E.C.4, at 7 p.m. "The Bergen-Oslo Railway," by Mr. H. A. Vallance.
- Until October 15 (Sat.).—National Packaging Exhibition, at the City Hall, Deansgate, Manchester. Open 10.30 a.m. to 7 p.m.
- Until October 16 (Sun.).—International Container Exhibition, in Salon de l'Emballage, Exhibition Centre, Porte de Versailles, Paris.
- October 17 (Mon.).—Institute of Transport, at the Jarvis Hall (R.I.B.A.), 66, Portland Place, London, W.1, at 5.30 for 6 p.m. Presidential address by Brigadier-General Sir H. Osborne Mance.

Railway Stock Market

Kaffir gold shares scored fresh rises following the first monthly mining returns reflecting the higher price of gold, but markets generally have been more active, and good gains have also been shown by British Funds, short as well as long-dated stocks participating. Gilt-edged, contrary to views prevailing immediately following devaluation of the £, have rallied well, partly because, to some extent, the higher tax on distributed profits has robbed industrial shares of some of their attractions. Moreover, sentiment in the City seems to have benefited from talk of a general election before the end of the year. Buying of industrials was much more selective than recently, shares of the big exporting companies being favoured, and also those of companies whose dividends are unlikely to be reduced in future as a result of the higher tax on distributed profits. It is also being assumed in the City that if the general election brought about a change of Government, dividend limitation would be abolished or modified considerably. Gains in long-dated British Funds have been striking, and the nationalisation stocks participated fully in the rise. Transport 3 per cent. (1978-88) moved up to 92½, the 3 per cent. (1968-73) to 95, and the 3 per cent. (1967-72) to 94½, while, following its recent sharp decline, 3 per cent. Gas stock has rallied sharply to 91½ at the time of writing.

Generally there was not a great deal of business in foreign rails, but there were some good features. United of Havana stocks remained lively in anticipation of the promised statement on the take-over negotiations now in progress. The 1906 debentures touched 29, but later eased to 27½ in active dealings. Leopoldina stocks were dull and mostly lower where changed, awaiting the expected announcement from the company of the basis on which the purchase money will be divided among the various classes of stocks. News that a committee of holders of the ordinary stock has been formed to press their claims also affected sentiment. This, however, emphasised that the drawing up of an equitable scheme for sharing out the purchase money is very difficult because of the rights of the various debenture and other stocks and the necessity for the scheme

to take into account the substantial interest arrears outstanding. If, as the ordinary stockholders' committee claims, the ordinary stockholders should have at least 25 per cent. of the nominal value of their holdings, it is hard to see how holders of preference stock could have fair terms, including payment of their large arrears of dividend. The ordinary stock, after being down to 9, strengthened to 9½, preference was 29, the 4 per cent. debentures 93, and 6½ per cent. debentures 134. Leopoldina Terminal 5 per cent. debentures have receded to 104; the ordinary £1 units changed hands around 3s. 4½d. Elsewhere, Great Western of Brazil eased to 142s. 6d. after an earlier rise. There was a little profit-taking in Antofagasta preference stock, which eased to 44½; the ordinary was 8. In other directions, Beira Rails kept at 50s. 6d. Brazil rail gold bonds have been active around 41½. Canadian Pacific eased to 25½, Central Uruguay have kept at 11½, while Manila "A" debentures and preference shares were 91 and 8s. 6d. respectively. Mexican Rail 6 per cent. debentures showed firmness at 42½, but Northern Rail of Mexico 4½ per cent. bonds eased to 17½. Nitrate Rail shares remained at 75s., with few shares available in the market. San Paulo 10s. units were again active, but moved slightly lower at 14s. 9d. Guayaquil & Quito 5 per cent. gold bonds changed hands at 21, and La Guaira & Caracas at 13½, with the 5 per cent. debentures at 47½.

Road transport and bus shares have been firm on the view that there would be no further nationalisation of road transport if the Government were defeated at the general election. Lancashire Transport were 80s., Southdown 117s. 6d. xd. and West Riding 72s. 6d.

Shares of locomotive building and engineering companies lost part of their recent gains, Vulcan Foundry easing to 19s. 9d., North British Locomotive to 19s. 6d., and Beyer, Peacock to 20s., while Wagon Repairs 5s. shares were 16s. 9d. Gloucester Wagon, however, continued firm at 50s. Iron and steel shares remained out of favour, Firth Brown coming back to 70s., while Colvilles were 32s. 6d. and Stewarts and Lloyds 52s. 4½d. United Steel rallied slightly to 26s. 3d. awaiting the results.

Traffic Table of Overseas and Foreign Railways

Railways	Miles open	Week ended	Traffics for week		Wk. of week	Aggregate traffics to date	
			Total this year	Inc. or dec. compared with 1947/48		Total 1948/49	Increase or decrease
South & Central America	Antofagasta...	811	25.9.49	£ 63,570	+	£ 2,520,410	+
	Costa Rica ...	281	July, 1949	35,287	+	35,287	+
	Dorada ...	70	July, 1949	29,403	+	200,008	+
	G.W. of Brazil	1,083	21.5.49	19,200	+	755,800	+
	Inter. Ctl. Amer.	794	Aug., 1949	\$1,023,467	+	\$8,601,268	+
	La Guaira ...	22½	Aug., 1949	\$107,606	+	\$859,223	+
	Leopoldina ...	1,902	28.5.49	43,288	+	965,094	+
	Nitrate ...	382	15.9.49	19,046	+	321,595	+
	Paraguay Cent.	274	23.9.49	\$156,246	+	\$1,726,125	+
	Peru Corp.	1,059	Aug., 1949	246,670	+	473,214	+
Canada	Salvador ...	100	May, 1949	c94,000	+	c1,884,000	+
	Taltal ...	154	Aug., 1949	9,335	+	19,995	+
	United of Havana	1,301	11.6.49	\$231,311	+	\$13,733,928	+
Canada	Canadian National...	23,473	July, 1949	10,351,250	—	69,544,750	+
	Canadian Pacific ...	17,037	Aug., 1949	7,719,000	—	58,840,750	+
Various	Barsi Light*	202	Aug., 1949	21,465	+	155,467	+
	Belra ...	204	Feb., 1949	104,917	+	589,461	+
	Egyptian Delta	607	20.8.49	18,145	+	255,747	+
	Gold Coast ...	536	Aug., 1949	258,530	+	1,192,125	+
	Mid. of W. Australia	277	July, 1949	20,862	+	20,862	+
	Nigeria ...	1,900	July, 1949	489,380	—	1,771,747	—
	South Africa ...	13,347	10.9.49	1,465,046	+	34,455,787	+
	Victoria ...	4,744	May, 1949	1,513,772	+	65,626	—

* Receipts are calculated @ 1s. 6d. to the rupee